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ALBACORE TROLLING AND LONGLINE EXPLORATION IN EASTERN NORTH PACIFIC WATERS DURING MID-WINTER 1981

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Center

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NOAA Technical Memorandum NMFS

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This is a report of a study conducted cooperatively between the National Marine Fisheries Service, Southwest Fisheries Center and Southwest Region, and the American Fishermen's Research Foundation (AFRF). A major part of the funding was provided by Saltonstall-Kennedy funds awarded to AFRF.

U.S. DEPARTMENT OF COMMERCE
Philip M. Klutznick, Secretary
National Oceanic and Atmospheric Administration
Richard A. Frank, Administrator
National Marine Fisheries Service
Terry L. Leitzell, Assistant Administrator for Fisheries

SUMMARY

Three chartered commercial fishing vessels using modified halibut longlining gear conducted an exploratory albacore longlining operation 700 to 900 n. miles west of San Diego during January-February 1981. Each vessel fished approximately 300 hooks per longline set in and about the thermocline at depths of 300 to 450 feet. Daily catches, standardized to 300 hooks/day, ranged from 0 to 37. Excluding the initial several sets which were largely experiments with gear, the mean albacore catch was 24, equivalent to 8 fish per 100 hooks. The catch rate would have been even higher; however, fish loss averaged 16% per set due to line twisting, which can be greatly reduced by gear modification. The catch fell into two size groups, 12-20 pounds and 25-35 pounds. The overall average weight was 23 pounds. Extrapolating the catches made during the survey indicate that albacore production may average 3000 pounds per set using a longline with 1500 to 2000 hooks.

If these catches for this very modest effort prove to be representative of the season and region, then there is a strong potential for expansion of the United States albacore fishery. However, more exploratory effort is needed 1) to substantiate these initial findings, 2) to expand our knowledge of albacore distribution in time and space, 3) to understand further the relation of ocean features to albacore distribution, and 4) to improve gear and fishing operations.

INTRODUCTION

The objective of this investigation was to evaluate the potential for establishing a U.S. fishery on the southern substock of North Pacific albacore tuna during winter months in eastern North Pacific waters. An area several hundred miles off the coast of southern California and extending nearly to the Hawaiian Islands was selected for the study. The U.S. albacore fishery does not operate in the winter, and in the selected area limited exploratory troll fishing has taken place only during other seasons of the year. The purposes of the study were: 1) to conduct exploratory fishing using trolling and longline fishing methods to evaluate the feasibility of catching albacore, 2) to make scientific observations to determine oceanographic conditions that may influence albacore distribution and relative abundance in the area, and 3) to collect data for albacore biology and fishery studies. The scientific observations that were planned included: (a) acoustic tracking to investigate vertical distribution and temperature relationships of albacore found in the area, (b) vertical and surface ocean temperature measurements, (c) albacore tagging for migration and stock structure studies and (d) collection of detailed records on fish catch, amount of gear fished, modifications made to fishing gear and fishing tactics, and size composition of fish caught.

BACKGROUND AND PLANNING

This study was carried on cooperatively between the National Marine Fisheries Service, Southwest Fisheries Center (SWFC) and the U.S. albacore fishing industry American Fishermen's Research Foundation (AFRF). Saltonstall-Kennedy funds awarded to the AFRF were used to charter fishing vessels and finance other costs to conduct the study. Fishery scientists

at the SWFC planned the overall study and worked with the AFRF to organize it. The actual operational aspects of the study were carried on by the AFRF. In addition, the SWFC provided scientific equipment and three fishery scientists went aboard one of the chartered fishing vessels to make scientific observations and keep detailed records related to the fishing operations.

Scientists at the SWFC reasoned that albacore might be available in high seas regions between California and Hawaii in winter for an expansion of the U.S. fishery based on results of earlier studies conducted cooperatively with AFRF, albacore fishery data from foreign fisheries, and albacore tag release-recovery data. Earlier SWFC research revealed a major division in the migratory patterns of albacore which comprise the U.S. west coast fishery. This division and other evidence suggest that there may be at least two groups or substocks of albacore in the North Pacific Ocean. The northern group migrates large distances across the North Pacific between the North American coast off the Pacific Northwest and regions in the western Pacific off Japan and is the target of active fisheries along these routes during most seasons. Considerably less is known about the southern group before it appears in and after it departs the seasonal fishery off California-Baja California. Tagging studies do indicate, however, that fish belonging to the southern group do not migrate in any appreciable numbers to the western Pacific but probably migrate to waters in the central North Pacific during winter months. In addition, the SWFC studies have shown that albacore are available 1 to 1-1/2 months prior to the traditional fishery in a region 600 to 1200 n.m. west of San Diego and that their distribution is associated with

the presence of the subtropical ocean front. The subtropical front is a zone of enhanced gradient in temperature and salinity that extends across the greater part of the North Pacific meandering about latitude 32° N. It exists as a signature of major horizontal and vertical circulation patterns.

The Japanese, and more recently the Koreans and Taiwanese, catch tunas and billfishes on longlines in the North Pacific subtropical zone during winter. It is estimated that albacore comprise about 40% of their catch (by number) in the subtropical North Pacific. Japanese, Taiwanese, and Korean fishermen have returned fish tags from longline-caught albacore that were tagged and released during a cooperative SWFC/AFRF albacore tagging program. The catch locations provided by the Japanese center about 32°N and extend from 133°W (800 n. miles off California) westward across the North Pacific.

The distribution and vulnerability of albacore, like other tunas, are largely affected by ocean temperature and vertical thermal structure. Surface temperatures favorable to the presence of albacore are found in a broad band about the subtropic front in winter. In the region 600 n.m. off California and beyond the thermocline is deep, typically 300 to 400 feet, and shoals towards the coast. Sonic tagging studies conducted on albacore by the SWFC show these fish to spend most of their time in the thermocline. Therefore, albacore are most likely to be vulnerable to longline gear that is designed to fish at these depths. In ocean regions where the thermocline is shallower (nearer the coast) trolling gear might still be effective.

The area targeted for exploratory operations was due west of San Diego (about 32°N) principally beyond several hundred n.m. offshore and extending westward to practical limits of operational logistics. Within this vast area plans provided that prevailing temperature and temperature fronts would be a determining factor in concentrating fishing efforts.[1] Longlining efforts were expected to have greater potential beyond 600 n. miles from the coast. The depth of the thermocline derived from XBT (expendable bathythermograph) traces would be used to determine the desirable depth range for longlining gear.

METHODS

FISHING VESSELS

Three commercial fishing vessels were selected by competitive bid for charter by the AFRF to carry on the study. The names of the fishing vessels, owners/captains and lengths are given in Table 1.

Table 1. Fishing vessels chartered for study.

Vessel Name	Owner/Captain	Length
Norcoaster	Elwin Cox	70 ft.
Taasinge	Herman Haggren	75 ft.
Vinland	Frank Martins	50 ft.

[1] Thermal distributions based upon satellite imagery would be sent to the vessels by radiofacsimile as available.

Three SWFC fishery scientists (Ronald Dotson, William Flerx and Robert Nishimoto) were on board the F/V Taasinge during the cruise to make scientific observations and assist in fishing operations.

AREA AND DATES OF STUDY

Field operations were conducted between January 13 and February 11, 1981 in an area extending about 200 to 800 miles west of San Diego, California. A drawing of the cruise track and areas of longline fishing operations is shown in Figure 1.

DESCRIPTION OF LONGLINE FISHING GEAR AND OPERATIONAL METHODS

Although longlining is an important fishing method used by foreign tuna fishermen, it has not been used by U.S. west coast fishermen to fish for tuna. Longlining is used by U.S. fishermen, however, to catch northern halibut, black cod and rockfish. Halibut longline fishing gear, modified to be similar to that used by the Japanese to fish for tuna, was used by the three chartered fishing vessels in this study. While the vessels were at sea, additional modifications were made to the gear and methods of fishing it to increase its effectiveness and ease of handling.

BEST DOCUMENT AVAILABLE

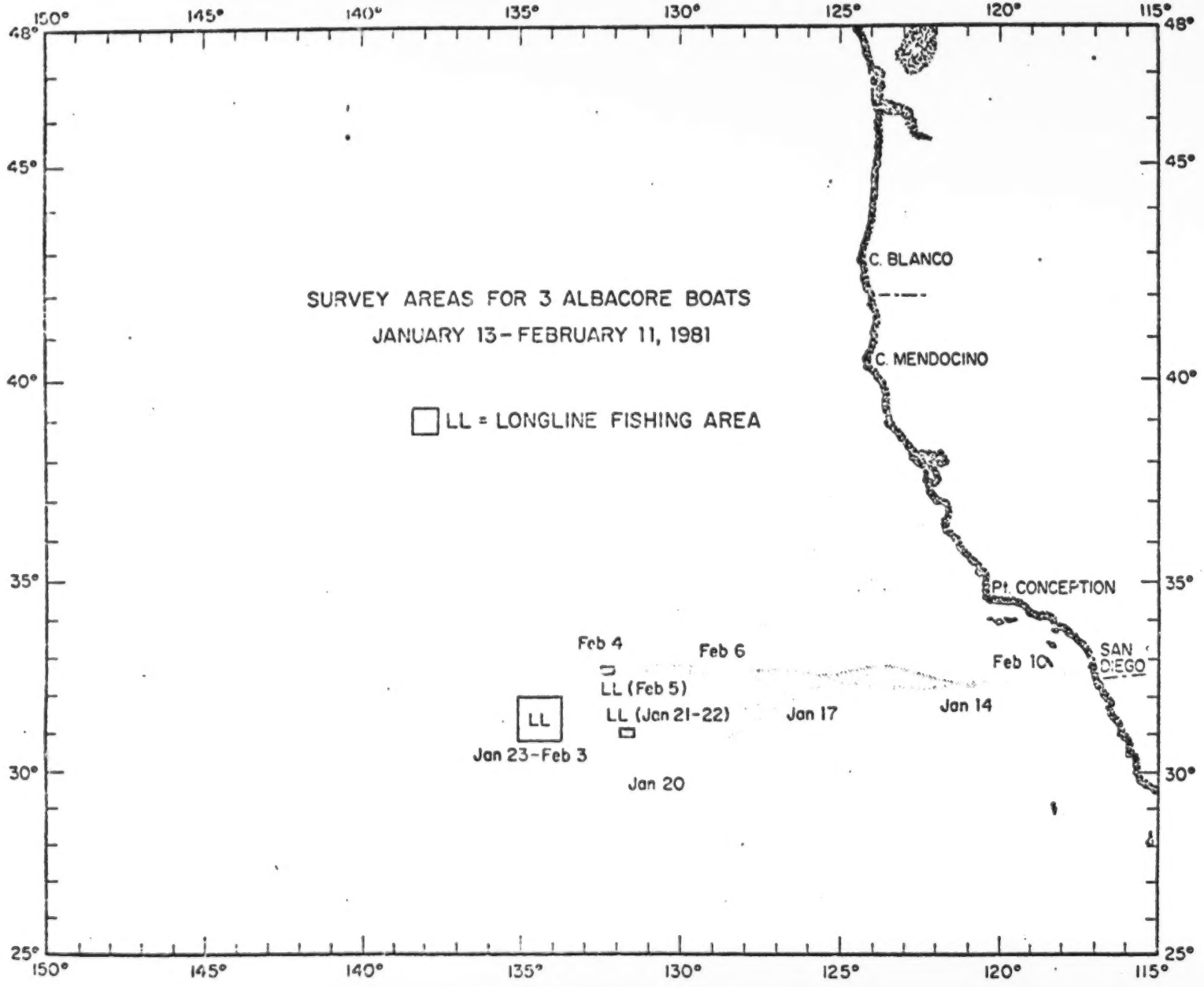

Figure 1. Ship track and area of operations.

Longline Fishing Gear Description

The longline gear consisted of a series of buoy lines suspended from the surface by floats, a main line attached to the buoy lines, and gangions with baited hooks suspended from the main line. Figure 2 gives a schematic sketch and identification of the components of the longline. The general design of the longline used by each of the vessels was similar; however, there were some differences in materials and details of construction. Schematic diagrams of the gear used by each vessel for each set (where information is available) are given in Appendix 1.

Buoy Line

The Norcoaster and Taasinge used buoy line constructed of 1/4 inch, three strand, right-hand lay nylon. This line, which is negatively buoyant, is used in the construction of halibut longline gear. No weight was used on the end of the buoy line by the Taasinge, however, a weight was used on some sets by the Norcoaster. The Vinland used 1/4 inch polypropylene line with about a one-pound weight on the end. The vessels did considerable experimentation with buoy line lengths. The early sets made by the Taasinge were with 150 foot buoy lines and the last half of the sets with alternately placed 300 and 450 foot lengths. Most of the sets made by the Vinland were with 300 foot buoy lines. The Norcoaster varied the buoy line lengths, often times within the same set and between sets, with lengths ranging from 120 to 460 feet. (See schematic diagrams of longline sets given in Appendix 1). Usually eighteen-inch diameter inflatable polypropylene floats were used for buoys, and usually every fourth to sixth buoy line was outfitted with a staff and

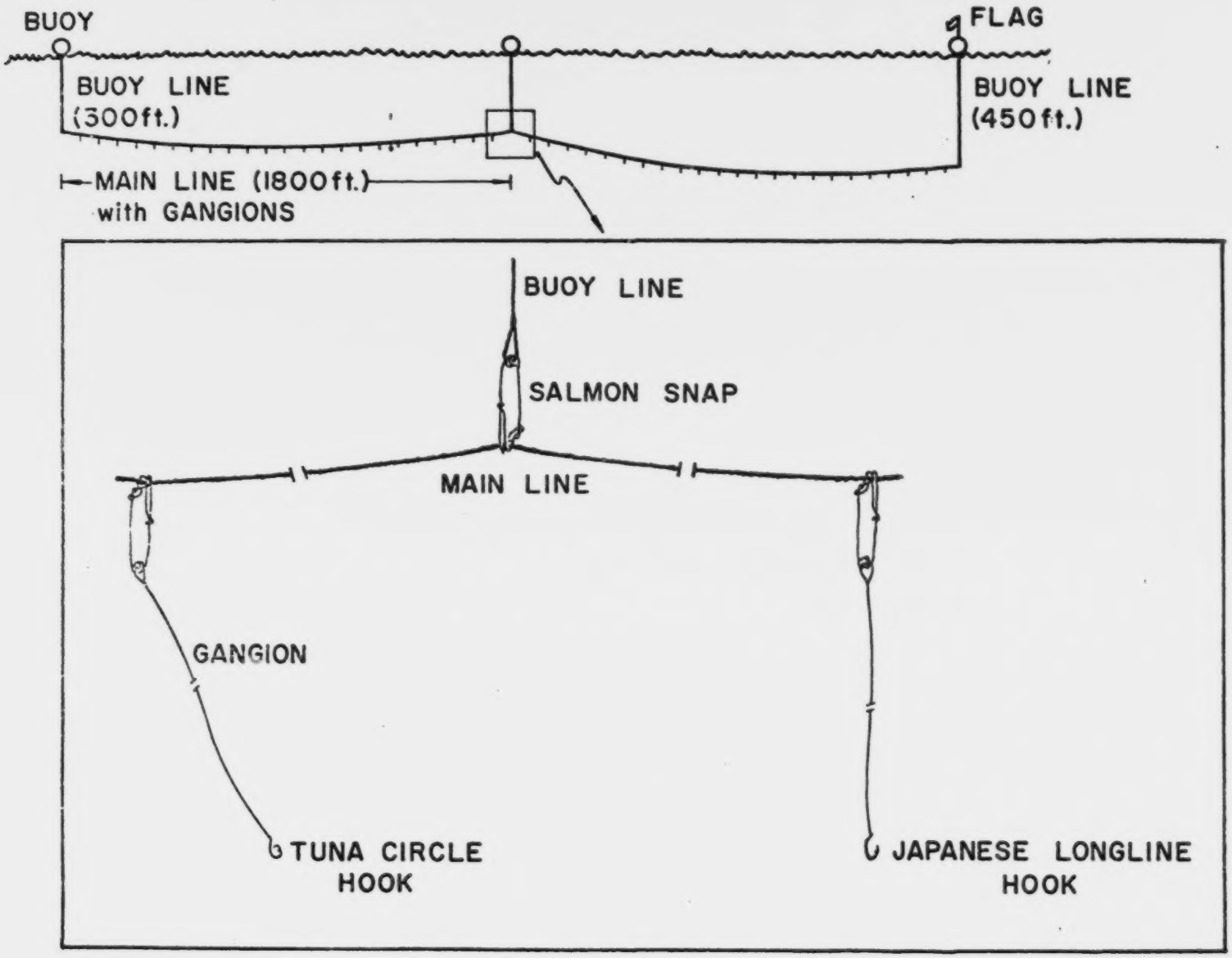

Figure 2. Schematic of longline gear showing various components used on survey.

flag. The buoy line was attached to the main line with salmon snaps (see Figure 2).

Main Line

The main line used by all three vessels was constructed of the same type of 1/4 inch, three strand, right-hand, lay nylon used by the Norcoaster and Taasinge for buoy lines. Usually one skate of main line, 1800 feet, was used between buoy lines on the Taasinge and Vinland and one to several skates on the Norcoaster (see drawings in Appendix 1). The Norcoaster typically fished 10 to 12 skates per set, the Taasinge 11 to 15, and the Vinland 8 to 12.

Gangions

Each of the vessels started the trip using 9-24 foot gangions constructed of 6-18 feet of 1/8 inch, polypropylene line and 3-6 feet of 175 pound test, twisted, stainless steel wire. This design of gangion proved to be unsatisfactory because of difficulties in handling and severe tangling and twisting problems. Each of the vessels did considerable experimentation with gangions using a number of different materials and varying lengths. The Taasinge and the Norcoaster eventually settled on using 6 to 9 foot gangions constructed entirely of 200-300 pound-test monofilament and used this design successfully for the latter half of their sets. The Vinland continued to use the polypropylene/wire combination of gangion, but shortened the polypropylene portion to about 4-1/2 feet. However, when the wire portion of a gangion became tangled or kinked due to catching a fish or twisting, the entire gangion was replaced

with one made of 6-8 foot 250 pound-test monofilament. At the end of the trip the Vinland had about 50% monofilament gangions and 50% polypropylene/wire combination. Information on the types of materials and lengths of gangion used during each longline set for each vessel is given in Appendix 1.

The gangions were attached to the mainline by salmon snaps (see Figure 2). The spacing between gangions on the main line was 90 feet on the Vinland and 60 to 90 feet on the Norcoaster and Taasinge.

Hooks

The Norcoaster used a combination of Mustad No. 39960 size 8 tuna circle hooks and Japanese longline size 34 hooks on the first 8 longline sets and the Mustad tuna circle hooks only on sets 9 through 12. The Taasinge used a combination of Mustad No. 39960 size 8 tuna circle hooks and Japanese longline sizes 34 and 38 hooks on sets 1 through 5, and the Mustad tuna circle hook on the remainder of the sets. The Vinland used mostly Mustad No. 39960 size 9 tuna circle hooks which were modified by offsetting the point by 1/8 to 3/16 inch and Japanese longline size 34 hooks, but also experimented with a limited number of 9/0 rock cod hooks and size 8/0 tuna circle hooks.

Bait

Frozen saury and squid were used for bait. The saury were 8 to 10 inches long and weighed 5 or 6 per pound. The squid were 6 to 10 inches long and weighed 3 or 4 per pound. Most sets were made with half the hooks baited with saury and half with squid with either alternate hooks

or all the hooks on alternate skates baited with the same kind of bait. A small number of sets were made using only squid as bait. Bait was thawed and hooks were baited just prior to each set on the Norcoaster and the last 9 sets made by the Taasinge. On all sets made after the first set by the Vinland and early sets made by the Taasinge, the hooks were baited at the time the gear was hauled. The gangions with the rebaited hooks were then placed in tubs and put in the fish hold to be refrozen and held until the next set was made, usually the following day.

Setting the Longline

The longline was set from the stern of the vessels, however, the details of setting differed on each vessel. On the Taasinge the main line was stored on the drum of a hydraulic-powered winch. The drum of the winch was put into freespool for setting the gear and the tension regulated by a friction brake. Buoy lines were attached to the main line by a salmon snap, usually at one skate (1800 ft.) intervals, and the buoys and flags were put over the stern after the buoy line had been paid out. Gangions were attached to the main line with salmon snaps at about 60 to 90 foot intervals as the line was paid.

On the Norcoaster the gangions were not removed from the main line between sets, and both were coiled and stored together in tubs with the hooks hung on the upper edge of each tub. The hooks were baited just prior to paying the main line and gangions out over the stern. On the Vinland the main line was also stored coiled in tubs, but separate from the gangions. When the gear was set the main line was paid out and the

gangions were attached to it with salmon snaps. The procedures used by the Norcoaster and Vinland for attaching the buoy lines were similar to those followed by the Taasinge.

The gear on all boats was set at a speed of 5 to 7 knots and usually required approximately one hour to set 10 to 12 skates. Most of the sets were made at or just prior to first light between 0700 and 0800 PST, and each vessel made one set in the afternoon. The direction that the gear was set varied depending on sea and wind conditions, and was also varied to test the relation of fishing success to the direction of set. Information on the direction each set was made is given in Appendix 1.

Hauling in the Longline

The haulback was started about 4-1/2 to 6 hours after the last buoy was set. On 9 of the sets made by the Taasinge and all the sets made by the Norcoaster and Vinland, the last skate of gear set was picked up first, and on 5 of the Taasinge's sets, the haulback was started with the first skate set (see Appendix 1). On all the vessels the gear was retrieved near midship on the starboard side at a vessel speed of approximately two knots. Line haulers were used to pull the main line aboard the Vinland and Norcoaster and a hydraulic winch was used aboard the Taasinge. Buoy lines were pulled and coiled by hand on all three vessels. On the Vinland the gangions were unsnapped from the main line, the hooks rebaited, and the line coiled and put into tubs and stored in the fish hold. The main line was coiled into tubs each holding about one-half a skate, and stored on the stern. On the Norcoaster the gangions were not removed from the main line and both lines were coiled and stored

together in tubs with the points of the hooks over the edge of each tub. On the Taasinge the gangions were unsnapped from the main line, any remaining bait removed, and the line coiled and stored in tubs with the hooks hung over the edges of the tubs. The main line was hauled and stored on the drum of the hydraulic winch. Albacore that were caught on the longline were usually brought on board the vessels with a gaff. The time required to complete the haul in operations was about 3 to 5 hours (see Appendix 1).

TROLL FISHING

Trolling was conducted along the track shown in Figure 1. Conventional albacore trolling jigs and fishing techniques were used and each vessel fished 8 to 12 lines. On most days when no longline sets were made, all three vessels trolled from dawn to dusk. On days when longline sets were made, the Norcoaster and Vinland usually trolled in the vicinity of the longline while the gear was "soaking."

SCIENTIFIC OBSERVATIONS

ACOUSTIC TRACKING OF ALBACORE

It was planned to conduct acoustic tracking experiments to make measurements of albacore depth distribution and to determine albacore-ocean temperature relationships. However, electronic instrumentation failure prevented these experiments from being done.

OCEAN TEMPERATURE MEASUREMENTS

Vertical profiles of ocean temperature down to approximately 1500 feet were measured with a Sippican Mark 4 Recorder-T4 Probe Expendable Bathythermograph System (XBT). XBT drops were made by each vessel[2] usually once a day when only troll fishing was conducted, and up to several XBT drops were made in conjunction with each longline set. Sea surface temperature (SST) measurements were monitored frequently on the Vinland and Norcoaster using electronic thermometers with readouts in the wheelhouse. SST measurements were made on the Taasinge using a bucket thermometer.

FISH TAGGING

Floy spaghetti-dart tags were used to tag a selected number of albacore on each vessel. Fork length measurements, to the lower whole centimeter, were made on each fish tagged and released, and the position, date, and SST were also recorded.

FISHING AND CATCH RECORDS

Longline Fishing

Records were kept on each vessel related to the longline fishery operations. These records usually included: date, times and locations at the start and completion of the set, haulback time, number of skates of

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[2]XBT on Vinland failed early in the cruise.

main line used, depth of buoy lines and distance between attachment of buoy lines to the main line, number and type of materials and lengths of gangions, type of bait, and weather and sea conditions. On the Norcoaster the location on the longline where each albacore was caught was recorded; whereas, on the Vinland only the total number of albacore caught on a set was recorded.

In addition to the information indicated above, special records were kept on the Taasinge for each hook as the longline was hauled aboard after a set. This information included: whether or not there was bait on the hook, hook lost or straightened, species of fish caught, fish that were hooked but lost and any malfunctions in the gear.

Troll Fishing

On days when only troll fishing operations were conducted records were kept on the date, times and locations at the start and finish of trolling, and numbers of fish caught. When trolling was conducted in conjunction with a longline set, only the general location of the trolling and total number of fish caught were recorded.

SIZE MEASUREMENTS OF ALBACORE

On the Taasinge fork length measurements were made on all albacore caught. On the other vessels fish weights were estimated and the range and predominant size noted for each day's catch.

OTHER OBSERVATIONS

Surface weather observations were recorded in conjunction with XBT drops and longline sets. Incidental sightings of marine mammals and shore birds were noted, however, no regular watch was maintained to make these types of observations.

LOGISTICAL SUPPORT

Forecasts of weather and sea conditions were very important to the fishermen because of the frequent high winds and rough seas that were encountered during the study. Weather charts prepared by the National Weather Service were received daily via radiofacsimile broadcast by the Vinland. The information contained on the charts was usually considered adequate, but often not timely. The special 5-day weather/sea condition narrative outlooks prepared by Ocean Data Systems, Inc., part of a NASA-Jet Propulsion Laboratory experimental Satellite Data Distribution System project, were also relayed to the vessels by radiotelephone from the Western Fishboat Owners Association (radio call sign WHG). According to the fishermen these forecasts were excellent and were valuable for planning fishing operations.

Information on ocean temperature frontal conditions was also broadcasted via radiofacsimile to the Vinland in support of the study. Satellite passes were received at the Scripps Institution of Oceanography Remote Sensing Facility and the infrared imagery was processed by SWFC

personnel. Charts showing the locations of temperature boundaries were prepared and transmitted via radiofacsimile by NMFS-licensed radio station WWD.

RESULTS

ALBACORE CATCHES MADE LONGLINING

Information for each longline set listing the date, location, number of hooks fished, number of albacore caught per set, and number of albacore caught per 100 hooks is given in Tables 2 to 4 (also see Appendix 1). For the Taasinge the number of fish caught per 100 hooks ranged from 0 to 12.2 and averaged 4.6 (Table 2); for the Vinland it ranged from 0 to 10.5 and averaged 5.5 (Table 3); and for the Norcoaster it ranged from 0 to 6.3 and averaged 2.6 (Table 4). Some care should be exercised when using the information given in Tables 2-4 to evaluate the potential for longlining because 1) knowledge gained from experimental changes in the gear during the early sets appears to have resulted in increased catches in the latter sets, and 2) the catch rates given in the Tables do not include fish that were lost. These points are probably especially true for the Taasinge, which caught a total of only 22 albacore during the first 6 sets for an average catch rate of 1.1 fish per 100 hooks, but caught a total of 216 fish during sets 7 through 13 for an average catch rate of 7.4 fish per 100 hooks.

Records kept on the Taasinge showed that the number of fish lost averaged 16% and was as high as 31%, e.g., set No. 7 (See Appendix 1).

Table 2. Summary of albacore longline catch and effort information for F/V Taasinge

Number	Date	Start Position of Longline Set	# of Hooks	# of Albacore	Catch/ 100 Hooks
1	21 Jan 81	31°04'N, 131°29'W	375	2	0.5
2	22 Jan 81	31°08'N, 131°48'W	253	2	0.8
3	23 Jan 81	31°18'N, 133°40'W	261	0	0.0
4	24 Jan 81	31°18'N, 134°20'W	346	0	0.0
5A	25 Jan 81	31°08'N, 134°40'W	368	11	3.0
5B	25 Jan 81	31°24'N, 134°36'W	105	1	1.0
6	26 Jan 81	31°24'N, 134°20'W	296	6	2.0
7	28 Jan 81	31°40'N, 134°29'W	341	26	7.6
8	29 Jan 81	31°30'N, 134°17'W	343	35	10.2
9	30 Jan 81	31°26'N, 134°13'W	386	18	4.7
10	31 Jan 81	31°15'N, 134°46'W	391	32	8.2
11	1 Feb 81	31°14'N, 134°43'W	483	14	2.9
12	2 Feb 81	31°05'N, 134°50'W	474	58	12.2
13	3 Feb 81	31°05'N, 134°53'W	487	33	6.8
14	5 Feb 81	32°49'N, 132°28'W	350	2	0.6
		Totals	5259	240	4.6

Table 3. Summary of albacore longline catch and effort information for F/V Vinland

Number	Date	Start Position of Longline Set	# of Hooks	# of Albacore	Catch/ 100 Hooks
1	23 Jan 81	31°24'N, 134°18'W	150	0	0.0
2	24 Jan 81	31°20'N, 134°22'W	180	9	5.0
3A	25 Jan 81	31°31'N, 134°36'W	200	14	7.0
3B	25 Jan 81	31°31 N, 134°36'W	100	5	5.0
4	26 Jan 81	31°35'N, 134°26'W	300	13	4.3
5	28 Jan 81	31°40'N, 134°31'W	200	3	1.5
6	29 Jan 81	31°22'N, 134°26'W	200	21	10.5
7	30 Jan 81	31°25'N, 134°20'W	217	17	7.8
8	31 Jan 81	31°12'N, 134°42'W	300	16	5.3
9	1 Feb 81	31°14'N, 134°49'W	300	22	7.3
10	2 Feb 81	31°02'N, 134°54'W	300	31	10.3
11	3 Feb 81	31°02'N, 134°54'W	300	15	5.0
12	5 Feb 81	32°40'N, 132°11'W	300	2	0.7
		Totals	3047	168	5.5

Table 4. Summary of albacore longline catch and effort information for F/V Norcoaster

Number	Date	Start Position of Longline Set	# of Hooks	# of Albacore	Catch/ 100 Hooks
Test	16 Jan 81	Near 33°N, 123°45'W	-	0	0.0
1	23 Jan 81	31°06'N, 134°24'W	275	0	0.0
2	24 Jan 81	31°22'N, 134°30'W	275	2	0.7
3A	25 Jan 81	31°20'N, 134°37'W	275	3	1.1
3B	25 Jan 81	31°20'N, 134°37'W	75	0	0.0
4A&B	26 Jan 81	31°07'N, 134°54'W	250	3	1.2
5	28 Jan 81	31°31'N, 134°38'W	250	6	2.4
6	29 Jan 81	31°20'N, 134°30'W	200	2	1.0
7	30 Jan 81	31°10'N, 135°00'W	150	6	4.0
8	31 Jan 81	31°15'N, 135°01'W	300	2	0.7
9	1 Feb 81	31°20'N, 135°02'W	300	18	6.0
10	2 Feb 81	31°10'N, 134°54'W	300	20	6.2
11	3 Feb 81	31°00'N, 134°50'W	350	22	6.3
12	5 Feb 81	32°47'N, 132°33'W	300	2	0.7
		Totals	3300	86	2.6

Fishermen on the other two vessels estimated similar fish losses. Most of the times when albacore were caught, the gangion was twisted around the main line. There were some instances when albacore were observed to come off the hook during the final stage of hauling the gear because the gangion twisted so tightly around the main line that the hook tore out of the fish's mouth. There were also a number of cases where the gangions were badly twisted and kinked, indicating that a fish had been hooked, but had been lost. Since no other tunas or other heavy fish (except one opah and one mako shark) were caught on the longline, it is believed that often when twisted and kinked gangions were recovered without fish, it resulted from albacore that had been hooked and subsequently lost. If the latter is true, and the number of twisted gangions without fish plus the number of albacore that were actually observed to come off the hook are included in determining hooking rate, the catch per 100 hooks for the Taasinge for sets Nos. 7 to 13 would be increased from 7.4 to 8.8.

Comparison of the albacore catch rates, expressed in the number of fish caught per 100 hooks, made by the 3 U.S. vessels during this study with albacore catch rates published for Japanese tuna longline operations conducted in the years 1969 to 1977 (the last year published data are available) in the areas between 30 to 35°N, 130° to 135°W and 30° to 35°N and 135° to 140°W (Table 5), show that catch rates made by the chartered U.S. vessels are 1 to 2 orders of magnitude higher than those published for Japanese longliners.

Table 5. Summary of the numbers of longline sets, hooks fished, albacore caught and number of albacore caught per 100 hooks by Japanese longline fishing operations in 5 degree blocks between 30° to 35°N.*

	130°-135°W				135°-140°W			
Year	No. sets	No. hooks	No. Alb.	No. Alb./ 100 hooks	No. sets	No. hooks	No. Alb.	No. Alb./ 100 hooks
1967	0	--	--	--	36	96,628	8	<0.1
1968	1	2,772	0	0.0	66	135,151	95	0.1
1969	4	9,454	0	0.0	251	539,472	473	0.1
1970	52	111,355	24	<0.1	255	523,325	439	0.1
1971	0	--	--	--	28	60,546	36	0.1
1972	18	41,330	7	<0.1	96	202,646	172	0.1
1973	0	--	--	--	205	403,527	248	0.1
1974	0	--	--	--	71	149,103	99	0.1
1975	0	--	--	--	17	38,148	3	<0.1
1976	0	--	--	--	19	39,248	417	1.1
1977	0	--	--	--	0	--	--	--

*Taken from statistics published by the Japan Fisheries Agency Far Seas Fisheries Research Laboratory, Shimizu, Japan.

ALBACORE CATCHES MADE TROLLING

Information on catches of albacore made by trolling is given in Figures 3, 4, and 6. The area of best troll catches along the cruise track was between about 123° to 127°W. Fishermen reported good signs for jig fishing in this area and made catches up to about 40 to 45 fish per boat per day. Shoreward of about 123°W jig catches were usually zero. Westward of about 127°W troll catches were usually less than one-half of those reported from between 123° to 127°W (see Figure 6).

In summary, results from the study showed 1) that the signs were good for trolling and that reasonably good catches were made trolling inshore of where most of the longline operations were conducted and 2) that trolling for the most part was not successful in the area further offshore where good catches were made on longlines.

SIZE COMPOSITION OF ALBACORE

The size composition of albacore caught by trolling and by longline aboard the Taasinge are shown in Figure 5. In general the troll caught fish were smaller than the longline-caught fish. Three size groups were caught trolling--about 3 to 4 pounds, 7 to 9 pounds and 12 to 20 pounds. Mostly two size groups were caught by longline--about 12 to 20 pounds and 25 to 35 pounds.

The relatively large proportion of 12 to 20 pound fish caught during the study is especially interesting. This size of fish usually makes up

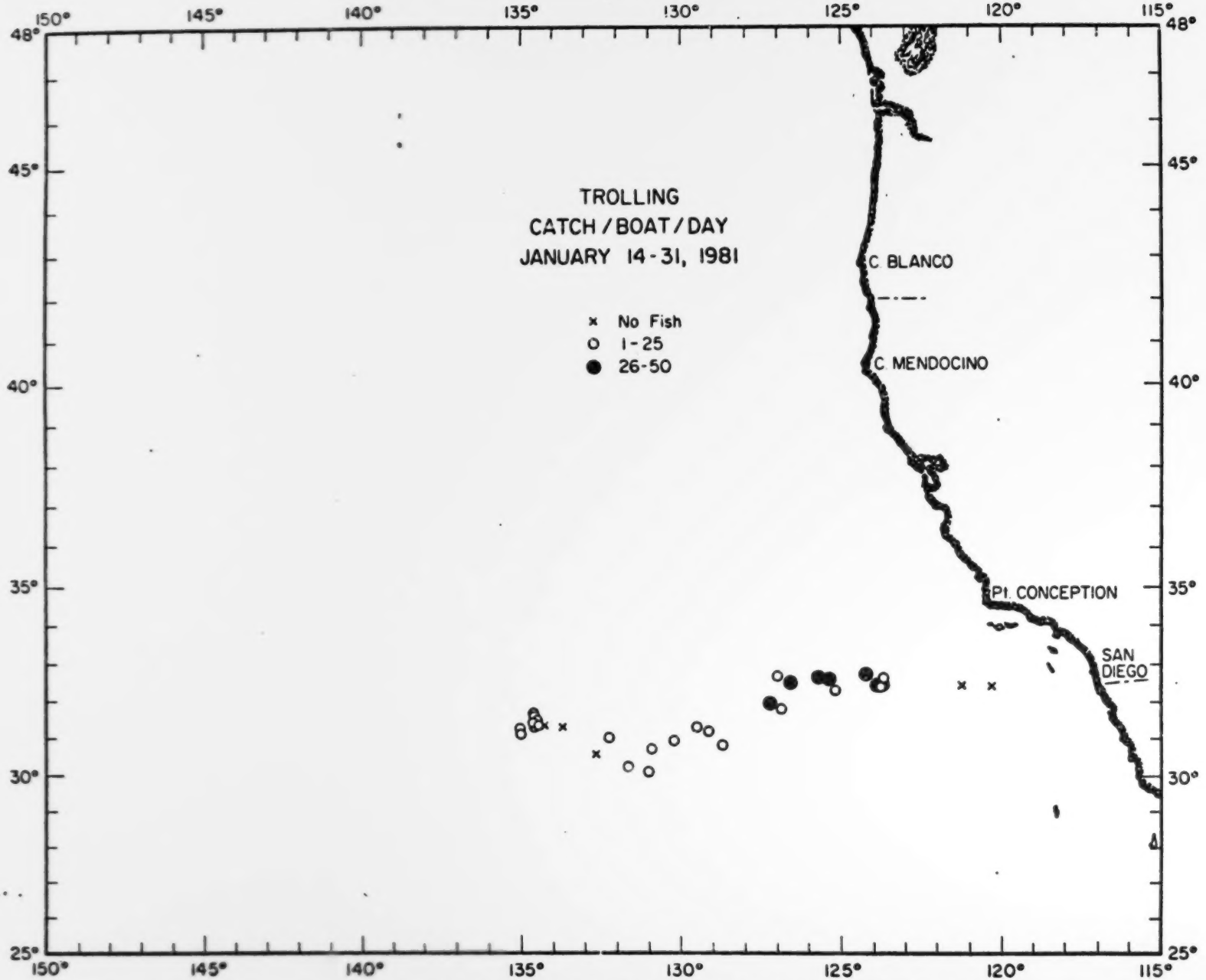


Figure 3. Albacore troll catches per boat per day made during period January 14 to 31, 1981.

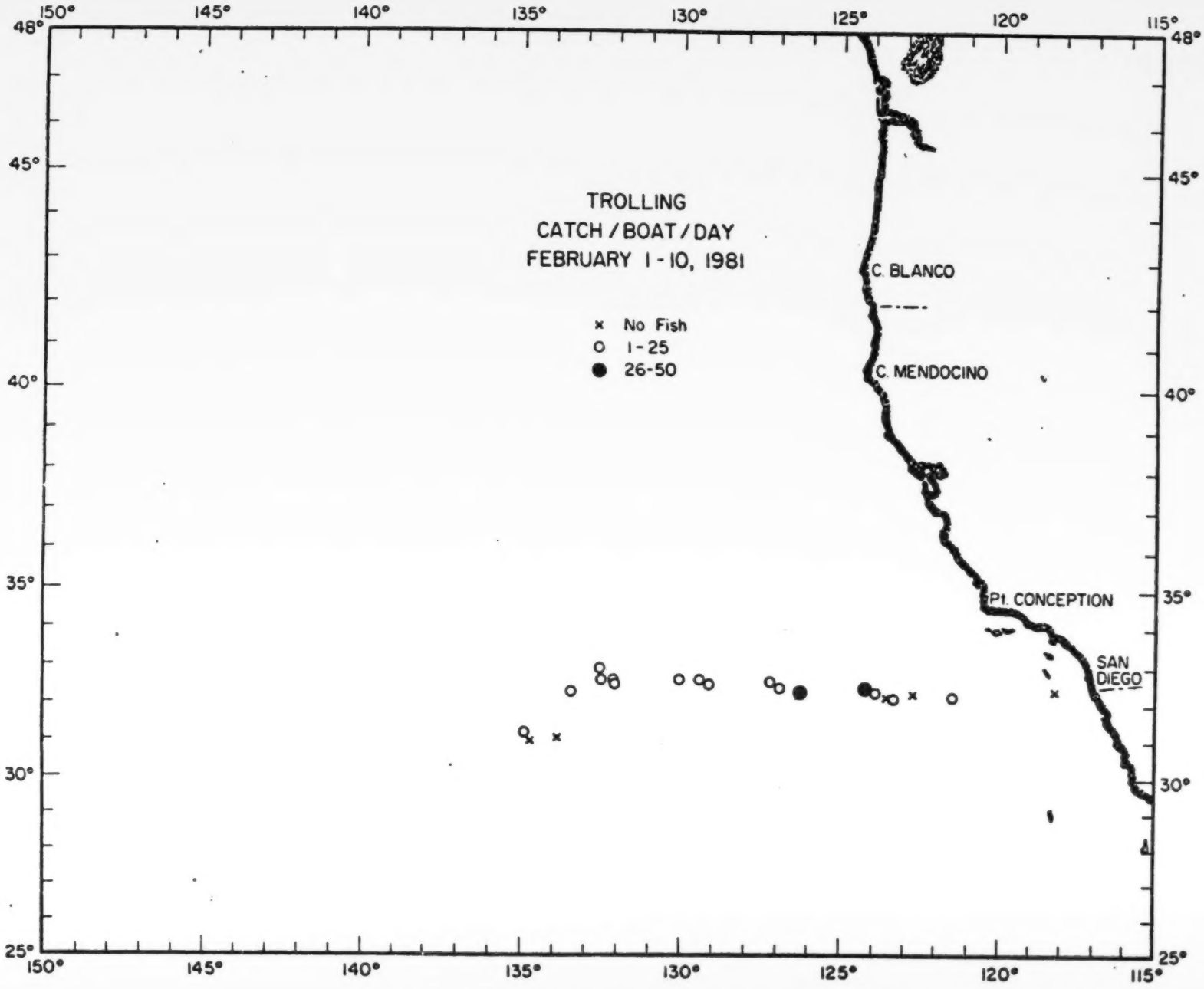


Figure 4. Albacore troll catches per boat per day made during period February 1 to 10, 1981.

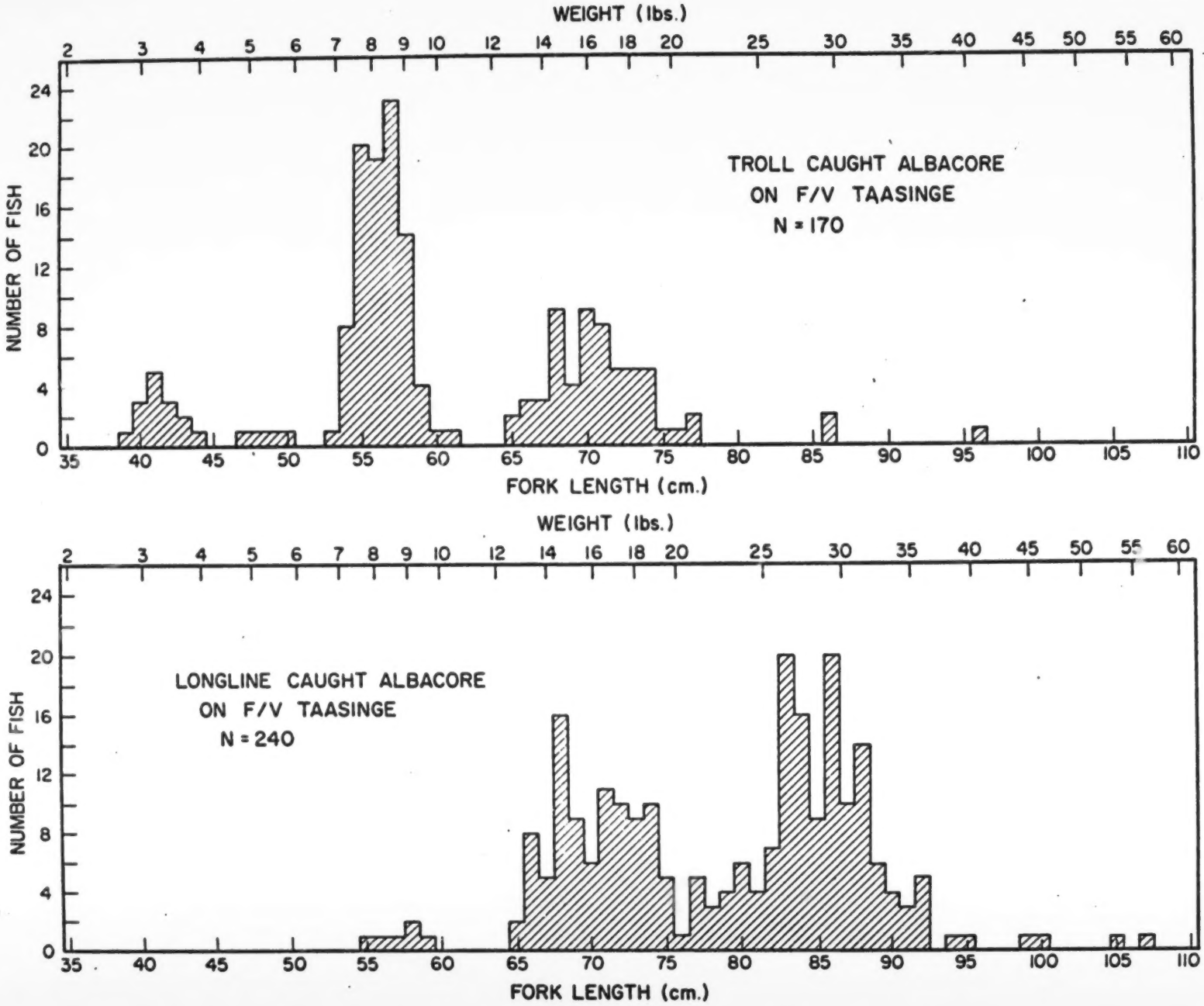


Figure 5. Size composition of albacore taken during the exploratory survey by trolling (upper) and longlining (lower).

the major part of the commercial catch taken during the normal albacore fishing season off California. However, in 1979 and again in 1980 the occurrence of this size of fish in the commercial catch was very low. This was an important factor contributing to the lower than average tonnage of albacore caught off California during these years. The results from this study suggest that perhaps the 12 to 20 pound fish may have been distributed further offshore than the fleet operated during the 1980 fishing season or that fish in this size group were distributed deeper than usual and were not vulnerable to surface fishing methods.

ALBACORE CATCHES IN RELATION TO OCEAN TEMPERATURE CONDITIONS

Sea surface temperatures generally ranged from 62° to 65°F and were very nearly 64°F for all longline sets. The depth to the top of the thermocline increased from 150 feet near 120°W to over 400 feet west of 130°W (Figure 6). Troll catches were greatest between 123° to 127°W where changes in thermocline depth were most abrupt. These changes in thermal structure are suggestive of frontal regimes associated with the outer boundary of the California Current. Westward of 130°W the troll catches decreased (as did the trolling effort). In this region there was a subsurface temperature maximum in which temperatures exceeded 65°F or sometimes 66°F. This feature and the greater depth of the thermocline may have acted to repress troll catches.

Representative longline catches for seven days are shown plotted on a vertical section of temperature in Figure 7. The catch values were standardized to a 300-hook set (the average number of hooks used per set

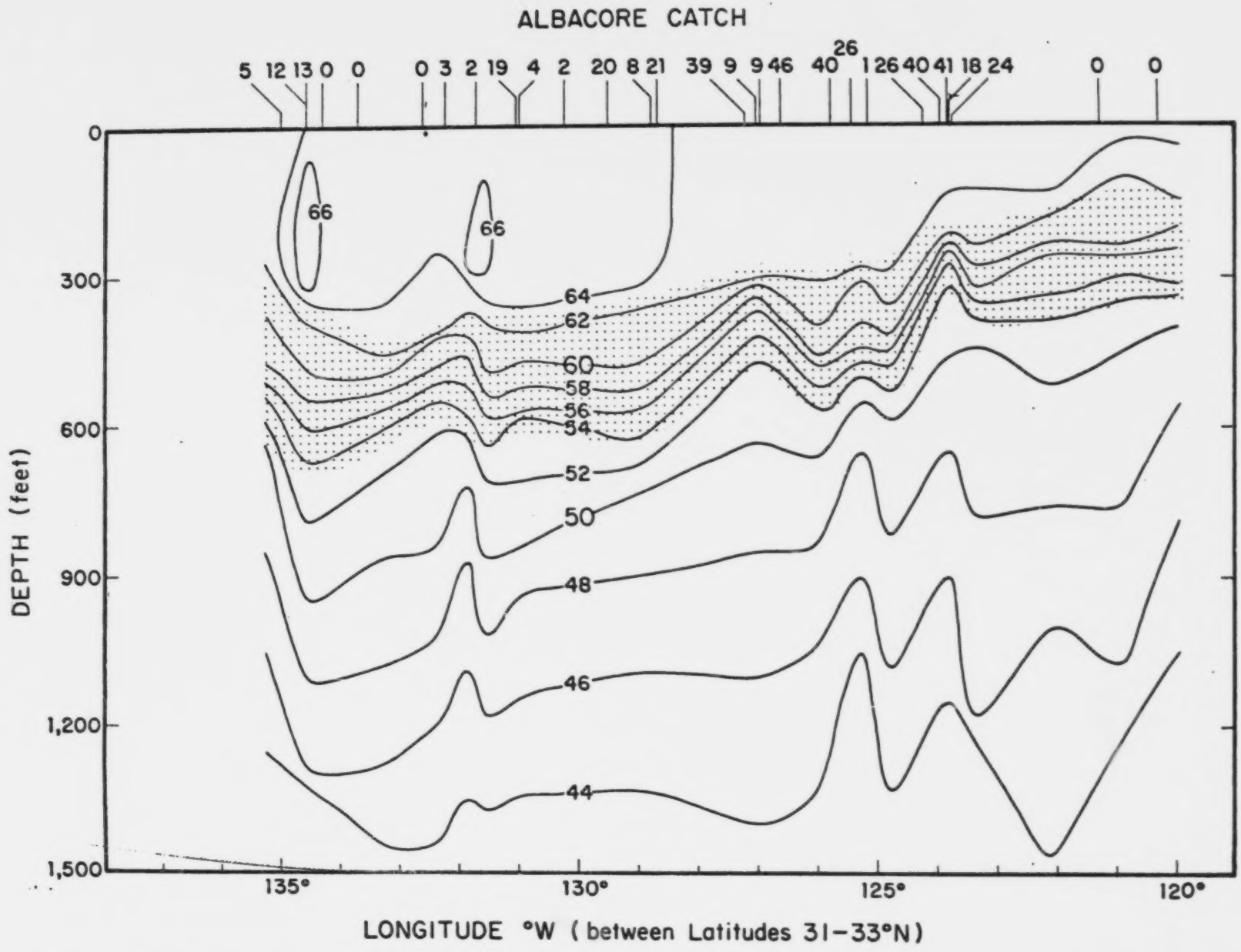


Figure 6. Vertical section of temperature derived from XBT traces for outbound leg. Thermocline is shown by shading. Troll catches of albacore for each vessel are plotted along top margin.

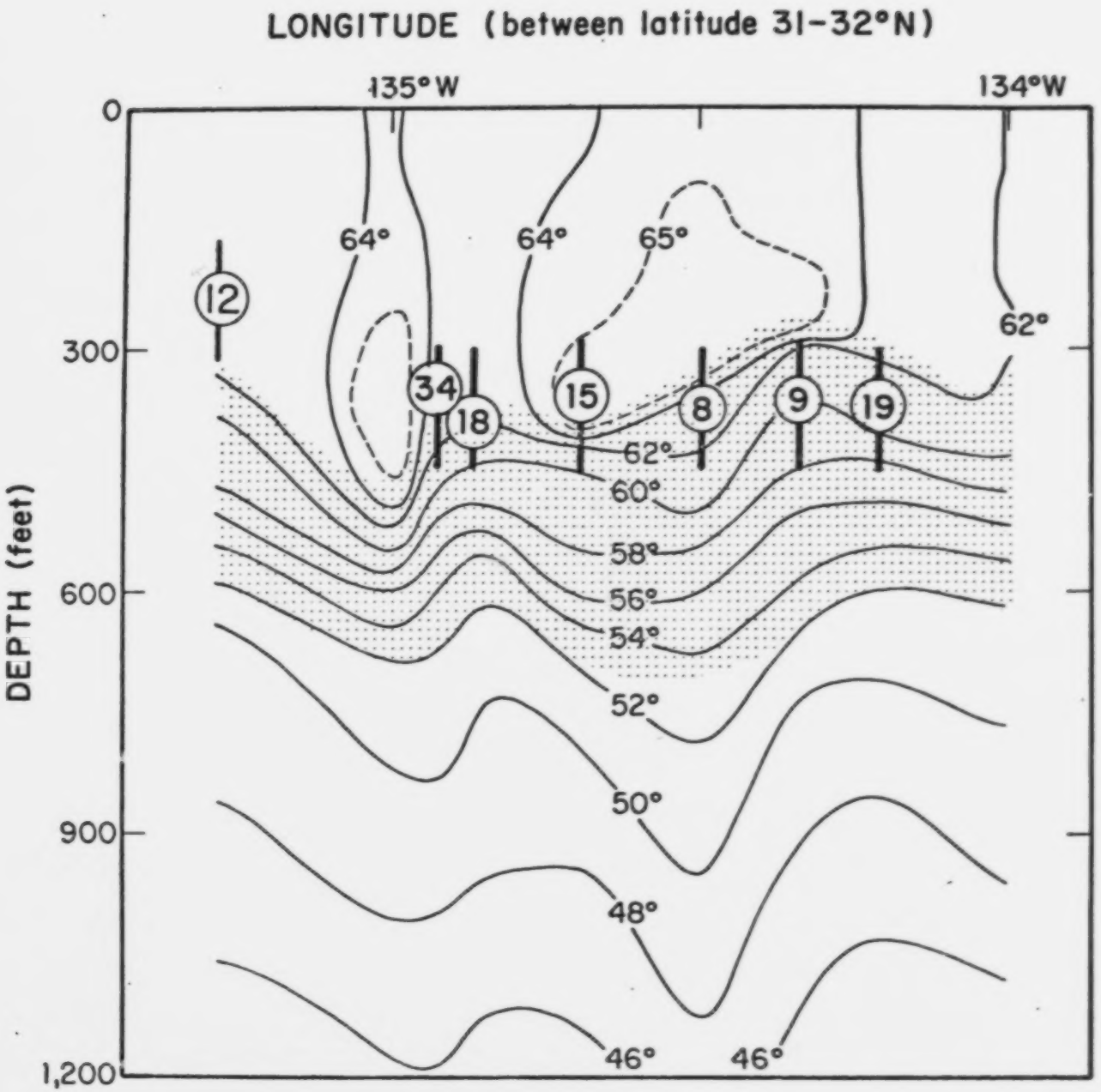


Figure 7. Vertical section of temperature crossing the longline survey region (approximately 70 nautical miles). Thermocline is shown by shading. Representative longline catches are plotted in circles with vertical bar denoting the estimated range of depths the gear was set.

throughout the survey) and averaged among the vessels. The temperature section, derived from XBT drops, cuts across the region where longlining effort was concentrated from January 24 through February 3. In this figure most of the catches are seen to occur near the base of the surface mixed layer and the upper levels of the thermocline. Prevailing sea surface temperatures were near 64°F while subsurface temperatures in the vicinity of the longline were typically 60 to 62°F. The high catch of 34 albacore occurs near a weak thermal front which depressed the isotherms. This co-occurence supports the earlier findings that thermal fronts have a tendency to aggregate albacore.

TEMPERATURE FRONTS DERIVED FROM SATELLITE IMAGERY RELATED TO ALBACORE CATCHES

Albacore troll catches are shown plotted on ocean thermal fronts derived from satellite infrared imagery in Figure 8. The satellite image was obtained through a large opening in the cloud deck on February 9 as the vessels were trolling on their return leg. The clouds are shown by shading. Within the opening the ship track for February 5 through 9 is shown as a heavy dashed line and daily troll catches by each vessel are plotted nearby. Thermal fronts were located and are depicted in Figure 8 as heavy meandering lines. Regions of cool, intermediate and warm waters are indicated and their estimated temperatures are given in the key. The vessels recorded a steady temperature of 62°F on February 6 through 8 and 61.5°F early on February 9. Troll catches ranged from 10 to 30 albacore. On February 9 the vessels crossed a thermal front near 32°20'N, 123°00'W where temperature dropped 1°F to 60.5°F. Thereafter only 2 albacore were taken. Thus the thermal fronts appeared to be a boundary to albacore distribution.

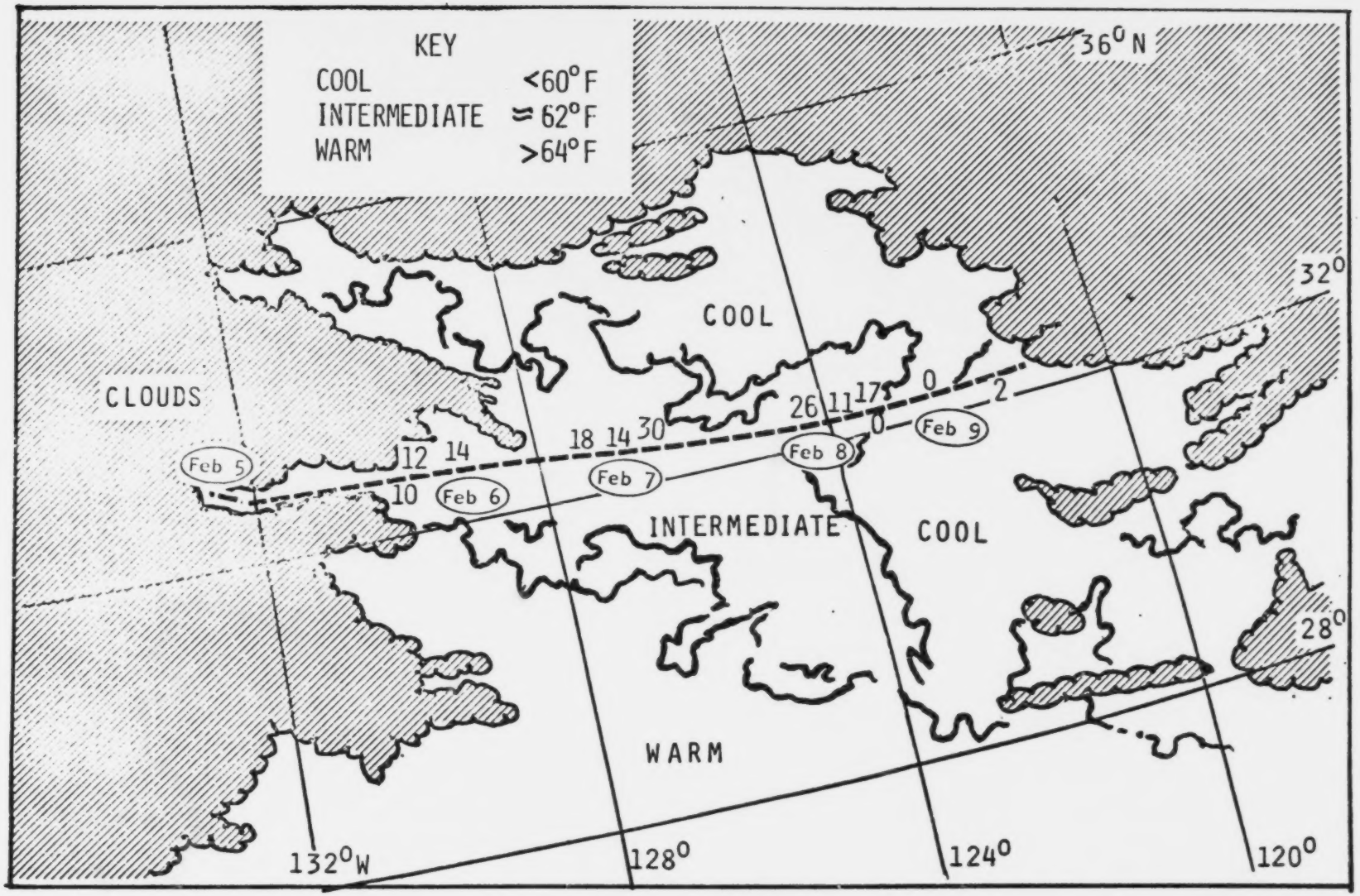


Figure 8. Thermal fronts derived from satellite infrared imagery for February 9, 1981 are shown as heavy meandering lines. Clouds shown by shading. Ship track (Feb. 5-9) shown by dashed line. Dates and albacore troll catches plotted along ship track.

ALBACORE TAGGING

A total of 56 albacore was tagged and released during the study. All the fish tagged were caught by trolling. Fish caught by longline were almost without exception unsuitable for tagging because they were dead or appeared near to death. A summary of the number of fish tagged and released by 1° squares is shown in Figure 9.

FISH CAUGHT IN ADDITION TO ALBACORE

No species of tuna other than albacore and only a limited number on non-tuna species of fish were caught on longline sets. A number of skipjack tuna and one yellowfin tuna (taken on the Vinland) were caught on trolling jigs mixed with albacore mostly in the area inshore of 130°W. In addition, one shortbill spearfish was caught on trolling jigs. A list of fish species caught by the Taasinge is given in Table 6.

WEATHER CONDITIONS

It was anticipated that weather could have an impact upon fishing operations. In the long-term average the frequency occurrence of major winter storms decreases southward from 35°N. In the recent several winters, however, storm fronts have reached more southerly latitudes than that given by the long-term average; these conditions occurred again this year. Despite occasional storms, fishing was curtailed for only one day. On that day winds were 50 knots westerly with gusts to 65 knots, seas were 6 feet and swell was 20 feet from the west. Of the total 30 operating days the winds exceeded 30 knots on eight days and sea and swell exceeded 15 feet on 5 days. On 14 days the winds were below 15 knots and the swell was less than 6 feet.

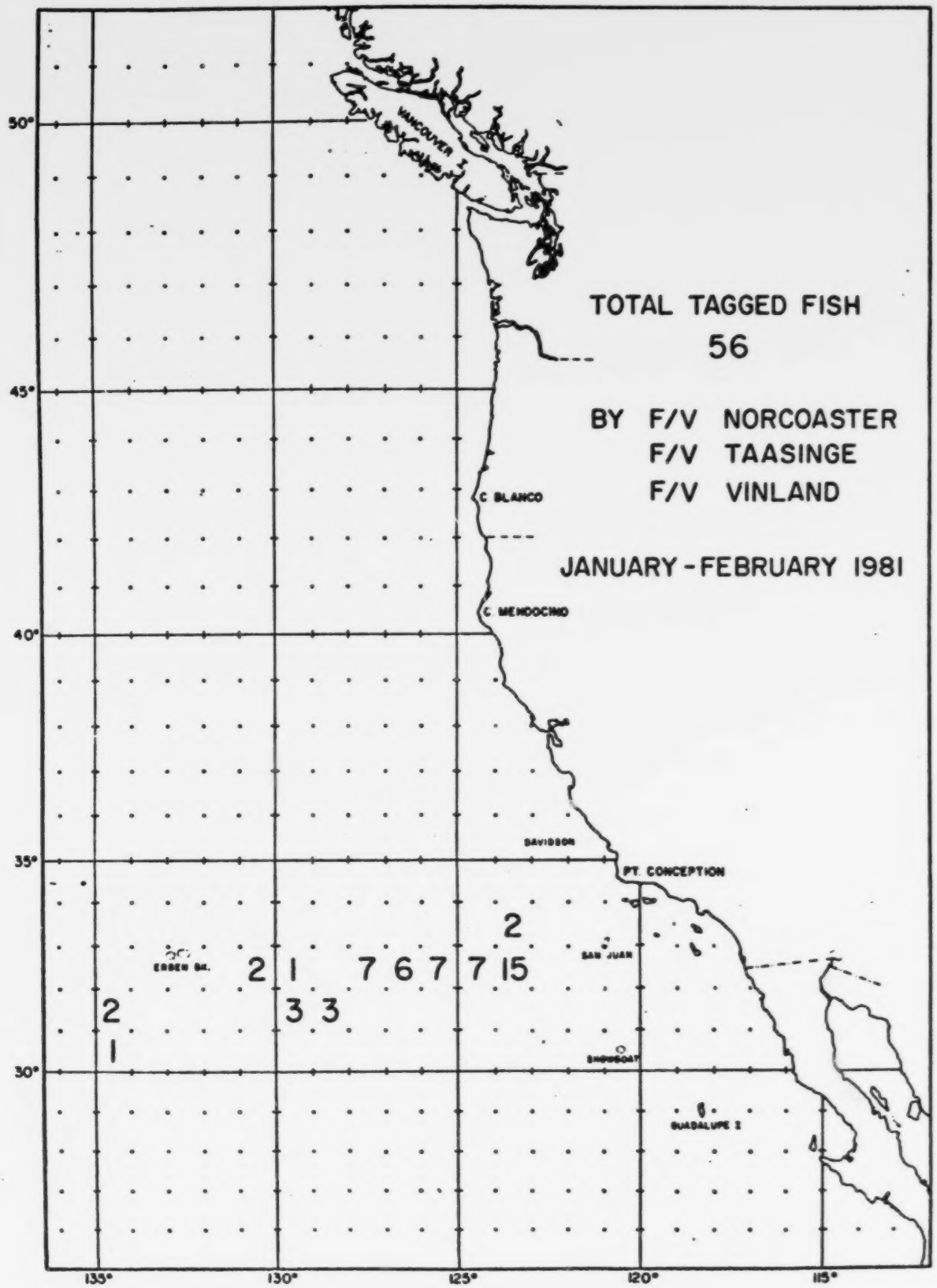


Figure 9. Number and location of albacore tagged and released during the survey.

Table 6. List of Fish Species Caught by F/V Taasinge

Species	No.
Caught on Longline	
Albacore, Thunnus alalunga	240
Mako shark, Isurus oxyrinchus	1
Pacific lancetfish, Alepisaurus borealis	8
Pomfret, Brama raii	1
Stingray, Dasyatis violacea	4
Opah, Lampris regius	1
Caught on Trolling Gear	
Albacore, Thunnus alalunga	171
Skipjack, Katsuwonus pelamis	24
Shortbill spearfish, Tetrapturus angustirostris	1

SUMMARY OF FINDINGS

Longlining

- Albacore were taken by longline during exploratory fishing operations in a region 700 to 900 miles due west of San Diego.
- As a minimum estimate, overall longline catch rates averaged 4.2 albacore per 100 hooks.
- A higher catch rate, ~8 albacore per 100 hooks, is calculated if the early sets are excluded from the average. Catch rates were greater in the latter sets because of knowledge gained from gear experiments in the early sets.
- Catch rates are potentially higher if losses of fish due to main line twisting and gangion wraparound can be eliminated with gear modifications. Fish losses were estimated as 16 percent of the total catch.
- Catches were greatest when gear was set to depths that ranged from the bottom of the upper mixed layer, which has about the same temperature as the surface, and the upper portion of the thermocline layer where temperature decreases rapidly. The thermocline was found at 300 feet and below. After initial experimentation, the longlines were typically set between 300 and 450 feet.
- No differences in catch rates were observed between using squid or saury for bait.
- Surface temperatures were nearly 64°F. Temperatures at 300 to 450 feet were 58°F to 64°F.
- Ocean thermal fronts were found in the vicinity of the longline sets. The highest catch was taken in the vicinity of a front.
- Two size groups of albacore were caught by longline: 12 to 20 pounds and 25 to 35 pounds.

Trolling

- Catches up to about 40 to 45 albacore per boat per day were taken by trolling during the outgoing and inbound tracks of the survey.
- Catches were highest between 123° and 127° W, which was coincident with the outer boundary of the California Current, and where surface temperatures were about 62°F to 64°F.
- Vertical thermal structure shows that the catches were greatest where the thermocline was changing from its great depths far offshore to shallower levels nearer shore.
- Three size groups of albacore were caught by trolling: 3 to 4 pounds, 7 to 9 pounds and 12 to 20 pounds.
- An abrupt decrease in troll catches on the inbound leg of the survey was associated with ocean thermal fronts indicated in NOAA-6 satellite imagery.
- A total of 56 albacore were tagged and released.

CONCLUSIONS

Results from the study suggest that the U.S. albacore fishery can be expanded to operate during winter months. Within a large area 700 to 900 miles west of San Diego albacore were caught each day during exploratory longline fishing operations. Logistic considerations limited the westward extent of this study; however, it is believed that good fishing success may also be expected farther to the west, probably to at least the longitudes of the Hawaiian Islands. It appears that albacore production may average approximately 3000 pounds per set using a longline with 1500 to 2000 hooks. This production estimate is based on an extrapolation of fish catches made using about 300 hooks. Experience gained during the study indicates that a 3-man crew can handle a 1500 to 2000 hook longline and that 50 to 75 foot vessels, typical of the U.S. albacore fleet, can operate in the latitudes of the study during winter months.

More exploratory effort is needed in trolling to arrive at conclusions regarding potential yields. However, the catches made from the small effort expended during this study were very encouraging.

RECOMMENDATIONS RELATIVE TO LONGLINE FISHING

The experiences gained in this study have resulted in a number of recommendations for longline fishing gear and fishing operations. These recommendations are, however, based on limited experience and will no doubt require modification in the future.

- Use a powered reel to haul and store the main line.
- Introduce procedures to reduce twisting and tangling of gear including use of:
  - braided, negatively buoyant main line
  - swivels and stops placed in main line at locations where gangions are attached
  - relatively short (approximately 6 to 12 feet) gangions made of 300 pound test monofilament with 2 or 3 swivels.
- Use snaps, preferably with a swivel incorporated, to attach gangions to main line.
- Bait hooks at time the gear is hauled and store gangions with baited hooks in freezer between sets.
- Use large tuna circle hooks with points offset or No. 32 & 34 Japanese longline hooks.
- Fish gear in and near the upper levels of the thermocline.
- Use XBT for determining vertical profile of temperature and depth of thermocline.
- Have capability for receiving weather facsimile charts.
- Use line puller, such as tuna trolling line puller, to haul buoy lines.
- Use on the order of 1500 to 2000 hooks per set which experience indicates a 3-man crew can handle.

APPENDIX 1

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 21, 1981 Set No.: 1

Position Begin Set: 31°04'N, 131°29'W

Position End Set: 31°06'N, 131°33'W

Time Set Began: 0700 PST Soaking Time: 5-11 hours

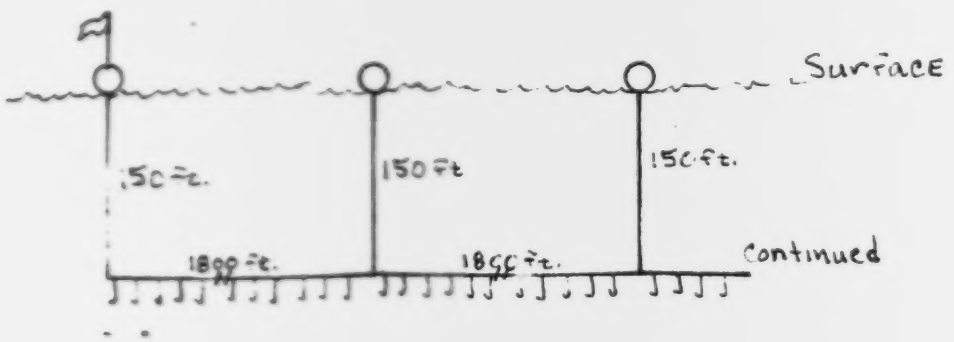
Type Hooks: #34 & #38 Japanese tuna hook; # 8 Mustad tuna circle hook No. Hooks: 375 Bait: squid & saury - Separate

Gangion Material and Length: 6 ft. 1/8" polypropylene w/ 3 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks No. Skates: 15

Direction of Set: East to West in trough Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 40 kt. wind, 10-15 ft. seas

Schematic Drawing of Gear:



Comments: 8 "skates" of sauries, 7 "skates" of squid.

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 22, 1981 **Set No.:** 2

Position Begin Set: 31°08'N, 131°48'W

Position End Set: 31°10'N, 131°51'W

Time Set Began: 0730 PST **Soaking Time:** 5-10 hours

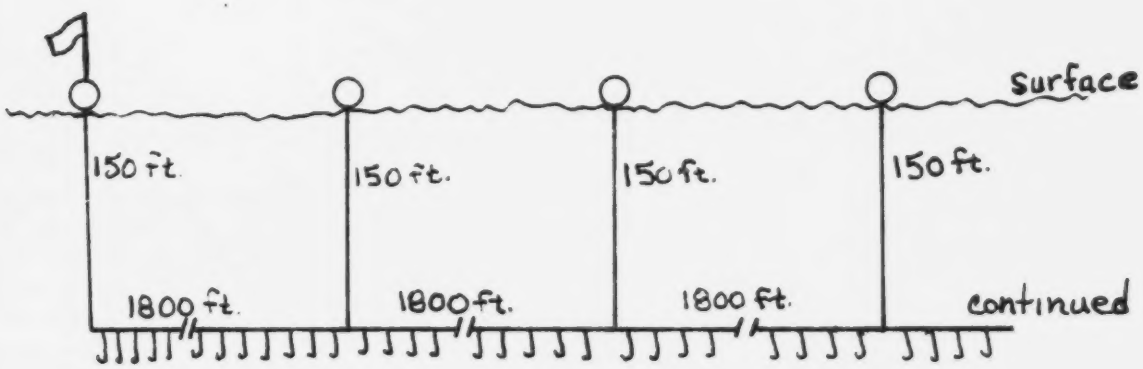
Type Hooks: #34 & #38 Japanese tuna hook; #8 Mustad tuna circle hook **No. Hooks:** 253 **Bait:** squid & saury - Separate

Gangion Material and Length: 6 ft. 1/8" polypropylene w/ 1 ft. 175# test stainless wire on #34 & #8 hooks; 4 ft. braided nylon w/1 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks **No. Skates:** 12

Direction of Set: East to West **Order of Pick Up:** Last buoy picked up first

Weather and Sea Conditions: 40 kt. wind, 15 ft. seas, heavy rain

Schematic Drawing of Gear:



Comments: 6 "skates" of sauries, 6 "skates" of squid.

F/V Taasinge, Longline Set #2

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy[b] # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9
1	B	B	B	NB	B	NB	NB	B	B
2	B	B	B	B	B	B	B	B	NB
3	B	B	B	B	NB	B	NB	B	NB
4	B	B	B	B	B	B	B	B	B
5	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B
7	B	B	B	B	NB	B	B	B	NB
8	B	B	B	B	B	B	B	NB	B
9	B	B	B	B	B	B	B	B	NB
10	B	B	B	B	NB	B	NH	NB	B
11	B	B	B	B	B	B	B	NB	B
12	B	B	B	B	B	B	B	B	B
13	B	B	B	B	B	B	B	NB	B
14	B	B	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	NB	B
16	B	B	B	B	NB	B	B	NB	B
17	B	B	B	B	B	NB	NB	B	B
18	B	B	B	B	B	NB	B	B	B
19	B	B	B	B	B	(ALB)	B	B	B
20	B	B	B	B	B	B	NB	NB	B
21	B	B	B	B		B	B	B	B
22	B	B	B	NB		B	NB	NB	B
23	B	B	B	B					B
24	B	B	B	B					B
25	B	B	NB	B					NH
26	B		B	B					NH
27			B	B					
28			B	NB					
29			B	B					
30			B	B					
31			NB	ALB					
32			B	B					
33			B	NB					
34			B	NB					
35			B	NB					
36			B	B					
37			B	NB					
38			B	ALB					
39			NB	NB					
40			B	B					
41			B	NB					
42			B	NB					
43				B					
44				B					
Cum Totals:									
# of Alb.	0	0	0	2	2	2	2	2	2
# of Hooks	26	51	93	137	157	179	201	223	249

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

[b]Buoy line broke during soaking period.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 23, 1981 Set No.: 3

Position Begin Set: 31°18'N, 133°40'W

Position End Set: 31°19'N, 133°44'W

Time Set Began: 0730 PST Soaking Time: 5-1/2 to 8-1/2 hours

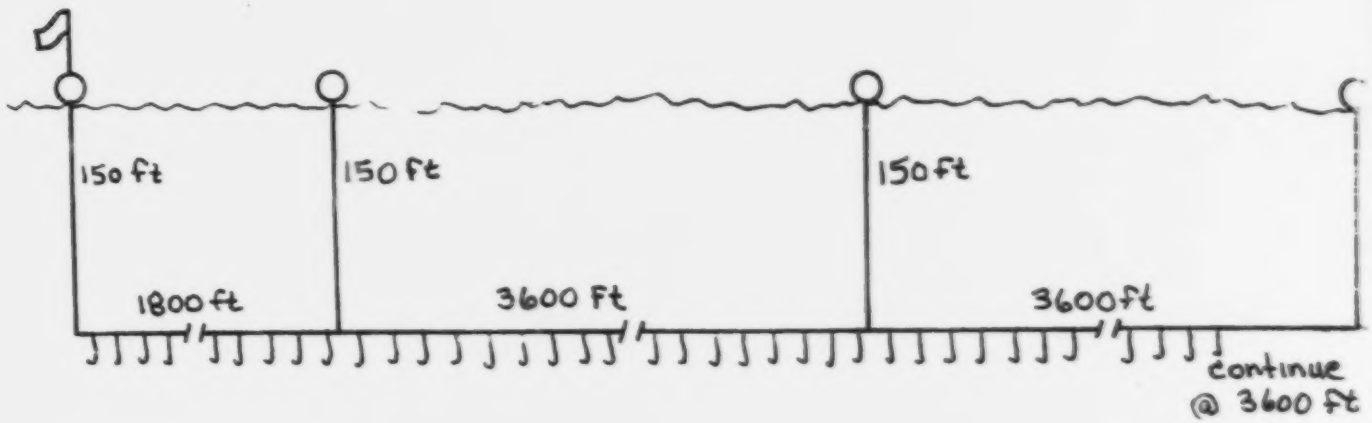
Type Hooks: #34 & #38 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 261 Bait: squid

Gangion Material and Length: 6 ft. 1/8" polypropylene w/ 1 ft. 175# test stainless wire on #34 & #8 hooks; 4 ft. braided nylon w/1 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks No. Skates: 11

Direction of Set: East to West Order of Pick Up: First buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 6 ft. seas

Schematic Drawing of Gear:



Comments:

F/V Taasinge, Longline Set #3

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6
1	NB	B	B	NB	B	B
2	NB	B	NB	B	B	B
3	NB	B	B	B	B	B
4	B	B	B	B	B	B
5	B	B	NB	B	B	B
6	NB	B	B	B	B	B
7	B	B	B	B	B	B
8	B	B	NB	NB	B	B
9	B	B	B	B	B	B
10	NB	B	B	B	B	B
11	B	NB	B	B	NB	B
12	B	B	B	NB	NB	B
13	B	B	B	B	B	B
14	NB	B	B	B	B	B
15	B	B	B	NB	NB	B
16	B	B	B	B	NB	B
17	B	B	B	B	B	B
18	B	B	B	B	B	B
19		B	B	B	NB	B
20		B	B	NB	B	NB
21		B	B	B	B	B
22		B	B	NB	B	B
23		B	B	B	NB	B
24		NB	B	B	B	B
25		B	B	NB	B	B
26		B	B	B	NB	B
27		B	NB	B	B	B
28		B	B	B	NB	B
29		B	NB	B	NB	NH
30		B	B	NB	NB	B
31		B	B	B	B	B
32		B	B	B	B	B
33		B	B	NB	B	B
34		B	B	B	NB	B
35		B	B	NB	B	B
36		B	B	B	NB	B
37		B	B	B	B	B
38		B	B	NB	B	B
39		B		B	B	B
40		B		B	B	B
41		B		B	B	NB
42		B		B	NB	B
43		B		B	NB	B
44		B		NB	B	B
45		NB		B	B	B
46				B	NB	NB
47				B		NB
48				NB		NB
49				B		B
50				B		NB
51				B		B
52				B		B
53				B		
54				B		
55				B		
56				B		
57				B		
58				B		
59				B		
60				B		
61				B		
62				B		
63				B		
64				NB		
65				B		
66				NB		
Cum Totals:						
# of Alb.	0	0	0	0	0	0
# of Hooks	18	67	109	179	229	285

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 24, 1981 Set No.: 4

Position Begin Set: 31°18'N, 134°20'W

Position End Set: 31°18'N, 134°27'W

Time Set Began: 0630 PST Soaking Time: 5-10 hours

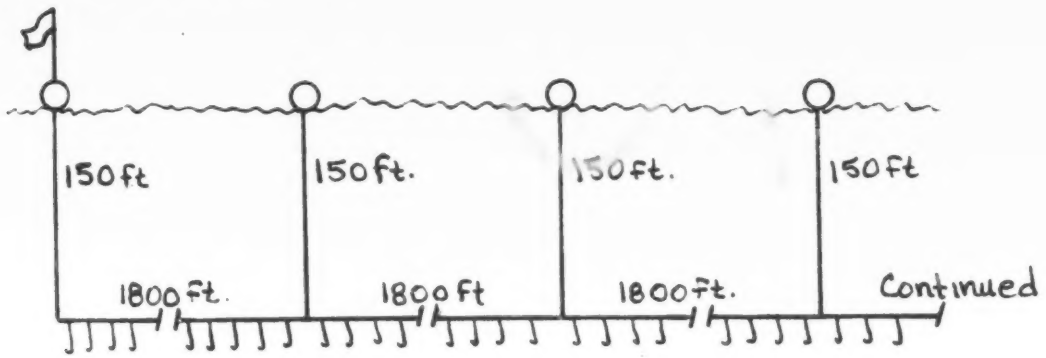
Type Hooks: #34 & #38 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 346 Bait: squid & saury

Gangion Material and Length: 4 ft. braided nylon w/1 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks No. Skates: 13

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 4 ft. swell

Schematic Drawing of Gear:



Comments:

F/V Taasinge, Longline Set #4

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13
1	B	B	B	B	B	B	B	B	B	B	NB	B	B
2	B	B	B	B	B	B	B	B	NB	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	B
4	B	B	B	B	B	B	B	B	B	B	B	B	B
5	B	B	B	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B	B	B	B	B
7	B	B	B	B	B	B	B	B	NB	POM	B	B	B
8	B	B	B	B	B	B	B	B	B	B	B	B	B
9	B	B	B	B	B	B	B	B	B	B	B	B	B
10		B	B	B	B	B	B	B	B	B	B	B	B
11		B	B	B	B	B	B	B	B	B	B	B	B
12		B	B	B	B	B	B	B	B	B	B	B	B
13		B	B	B	B	B	NB	B	NH	B	B	B	B
14		B	B	B	B	B	B	B	B	B	B	B	B
15		ALEP	B	B	B	B	B	B	B	B	B	B	B
16		B	B	B	B	B	B	B	B	NB	B	B	B
17		B	B	B	B	B	B	B	B	NH	B	B	B
18		B	B	B	B	B	B	B	B	B	B	B	B
19		B	B	B	B	B	B	B	B	B	B	B	NB
20		B	B	B	B	B	B	B	B		B	B	NH
21		B	B	B	B		B	B	B		B	B	B
22		B	B	B	B			B	NB			B	B
23		B	B	B	B			B				B	B
24		B	B	B	B			B				B	B
25		B	B	NB	B			B				B	B
26		B	B	B	B			B				B	
27		B	B	B	B			B				B	
28		B	B		B			B					
29		B	B		B			B					
30		B	B		B			B					
31		B	B					B					
32		B	B					B					
33		B	B					B					
34		B	B					B					
35			B					B					
36			B					B					
37			B					B					
38			B					B					
39			B					B					
40								B					
41								B					
42								B					
43								B					
44								ALEP					
45								B					
46								B					
47								B					
48								B					
49								B					
50								B					
51								B					
52								NB					
Cum. Totals:													
# of Alb.	0	0	0	0	0	0	0	0	0	0	0	0	0
# of Hooks	9	43	82	109	139	159	180	232	254	273	294	321	346

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., nooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
PAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 25, 1981 Set No.: 5A

Position Begin Set: 31°08'N, 134°40'W

Position End Set: Not recorded

Time Set Began: 0730 PST Soaking Time: 4-1/2 to 8-1/2 hours

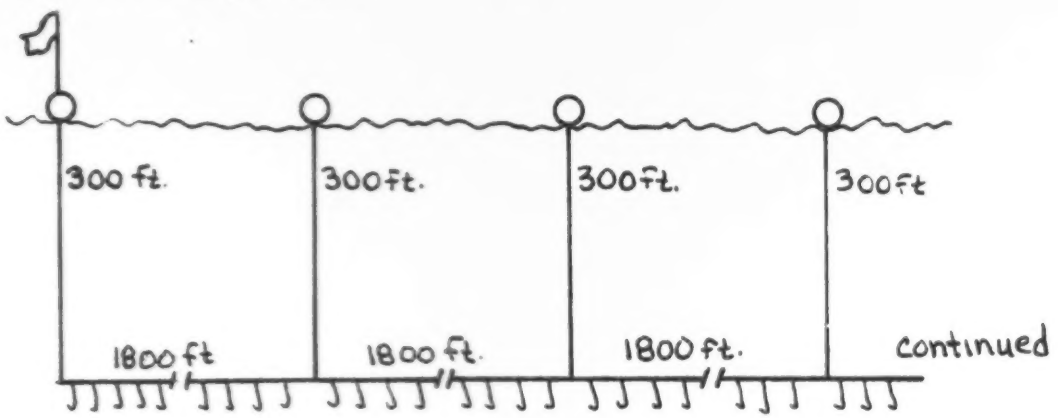
Type Hooks: #34 & #38 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 368 Bait: squid & saury

Gangion Material and Length: 6 ft. 250# test monofilament on #8 hooks; 4 ft. braided nylon w/1 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks No. Skates: 12

Direction of Set: Not recorded Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5-10 kt. wind, 4 ft. swell

Schematic Drawing of Gear:



Comments: 8 of 11 fish landed on monofilament leaders.

F/V Taasinge, Longline Set #5A

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12
1	ALEP	B	B	NH	B	B	B	NB	B	NB	B	NB
2	B	B	B	B	B	B	B	NB	B	B	B	NB
3	B	B	B	B	B	B	B	B	B	B	B	NB
4	B	B	B	B	B	B	B	NB	B	ALB	NB	NB
5	B	B	B	B	B	B	B	B	B	NB	B	B
6	B	B	B	B	B	B	B	NB	B	NB	B	NB
7	B	B	B	B	B	B	B	NB	B	B	B	NB
8	B	B	B	B	ALB	B	B	B	B	B	B	NB
9	B	B	B	B	B	B	B	B	B	B	B	NB
10	B	B	NB	B	B	B	B	NH	ALB	NB	B	NB
11	B	B	B	B	B	B	B	B	ALB	B	B	NB
12	B	B	B	B	B	B	B	NB	ALB	B	B	B
13	B	B	B	B	ALB	B	B	ALB	ALB	B	ALB	B
14	B	B	B	B	B	B	B	B	B	B	B	NB
15	B	B	B	B	NB	B	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	ALB	NB
17	B	B	B	B	NB	B	B	NB	B	B	NB	NB
18	B	B	B	B	B	B	B	NB	NB	B		B
19	B	B	B	B	NB	B	B	B	B	B		B
20	B	B	B	B	NB	B	B	B	ALB	B		B
21	B	B	B	B	NH	B	B	B	NB	B		B
22	B	B	B	B	B	B	B	B	B	B		B
23	B	B	B	B	NB	NB	B	B	B	B		B
24	B	B	B	B	B	B	B	B		B		B
25	B	B	NB	B	NB	B	B	B		B		B
26	B	B		B	B	B	B	B		B		B
27	B	B		B	B	NB	B	B		NB		B
28	B	B		B	B	B	B	B		B		B
29	B			B	B	B	B	B		B		B
30	B				B	B	B	B				B
31	B				B	B		B				B
32	B					B		B				B
33	B					B		B				B
34	B					B		B				B
35	B					B		B				
36	B					B		B				
37	B					B		B				
38	B					B		B				
39	B					B		B				
40	B					B		B				
41						B		B				
Cum. Totals												
# of Alb.	0	0	0	0	2	2	2	3	8	9	11	11
# of Hooks	40	68	93	122	153	194	224	265	288	317	334	368

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 25, 1981 **Set No.:** 5B

Position Begin Set: 31°24', 134°36'N

Position End Set: Not recorded

Time Set Began: 1600 PST **Soaking Time:** 2 hours

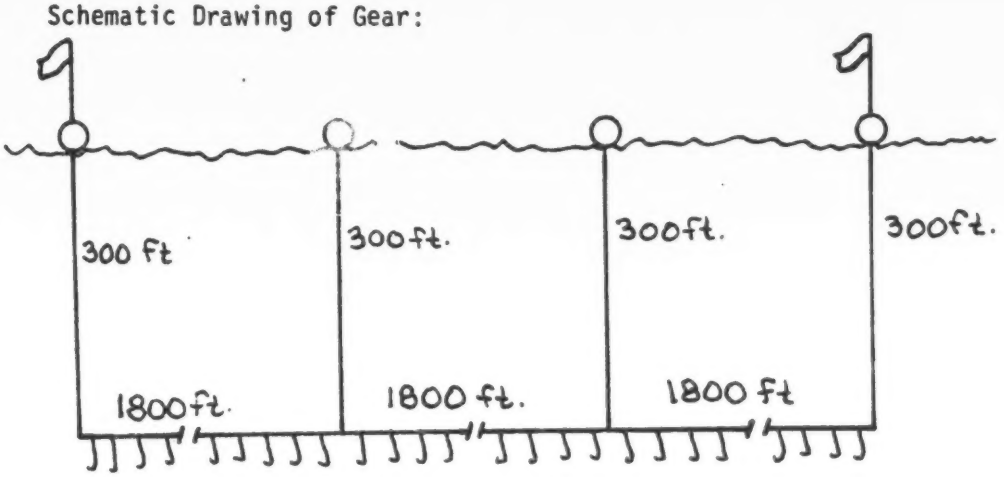
Type Hooks: #34 & #38 Japanese tuna hook; #8 Mustad tuna circle hook **No. Hooks:** 105 **Bait:** squid & saury

Gangion Material and Length: 6 ft. 250# test monofilament on #8 hooks; 4 ft. braided nylon w/1 ft. 175# test stainless wire on #34 & #8 hooks; 5 ft. 1/16" stainless wire on #38 hooks **No. Skates:** 3

Direction of Set: Not recorded **Order of Pick Up:** Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 4 ft. swell

Schematic Drawing of Gear:



Comments:

F/V Taasinge, Longline Set #5B

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3
1	B	B	B
2	B	B	B
3	B	B	B
4	B	NB	B
5	B	B	B
6	B	NB	B
7	B	B	B
8	B	B	B
9	B	B	B
10	B	B	B
11	B	NB	B
12	B	B	B
13	B	B	ALB
14	B	B	B
15	B	B	NB
16	NB	NB	B
17	B	NB	B
18	B	B	B
19	B	B	B
20	B	B	B
21	B	B	B
22	B	B	B
23	B	B	B
24	B	B	B
25	B	B	B
26	B	B	B
27	B	B	B
28	B	B	B
29	B	B	B
30	B	B	B
31	B	B	B
32	B	B	
33	B	B	
34	B	B	
35		B	
36		B	
37		B	
38		B	
39		B	
40		B	
Cum Totals:			
# of Alb.	0	0	1
# of Hooks	34	74	105

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY:
- B = Baited
- NB = Bait absent
- NH = Hook lost
- ALB = Albacore on hook
- ( ) = Albacore or fish that were lost
- ALEP = Lancetfish
- RAY = Stingray
- ABT - Albatross
- POM = Pomfret
- MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 26, 1981 **Set No.:** 6

Position Begin Set: 31°24'N, 134°20'W

Position End Set: 31°24'N, 134°23'W

Time Set Began: 0730 PST **Soaking Time:** 5-9 hours

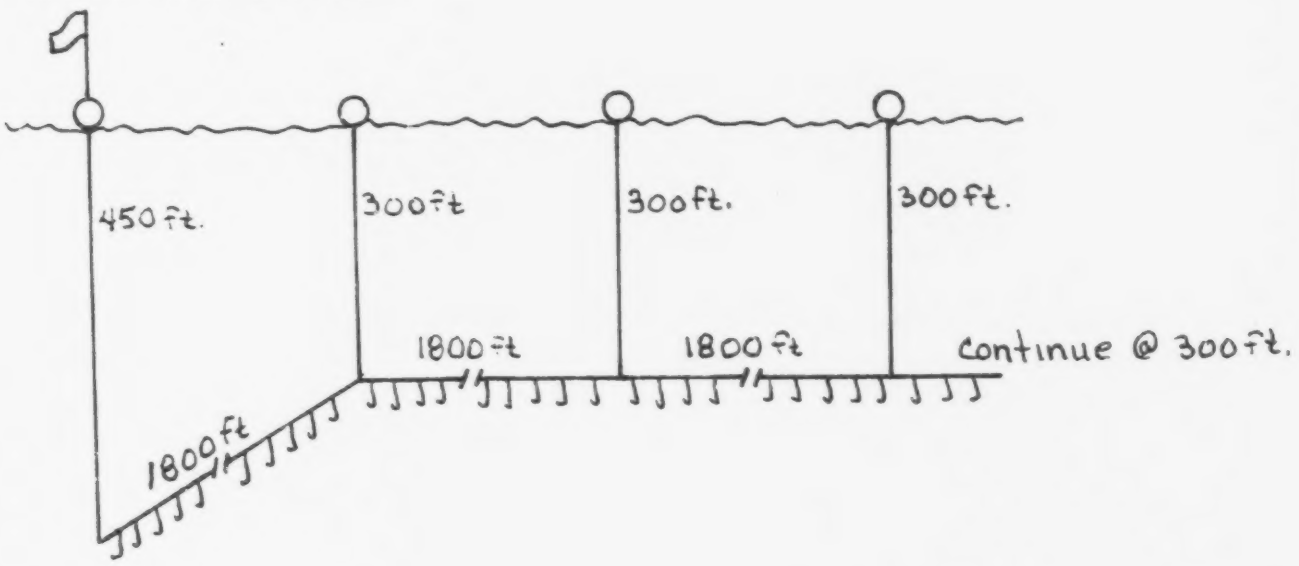
Type Hooks: #8 Mustad tuna circle hook **No. Hooks:** 296 **Bait:** squid & saury

Gangion Material and Length: 6-8 ft. 250-300# test monofilament; 4 ft. braided nylon w/1 ft. 175# test stainless wire **No. Skates:** 10

Direction of Set: East to West **Order of Pick Up:** Last buoy picked up first

Weather and Sea Conditions: 25 kt. wind, 5 ft. seas

Schematic Drawing of Gear:



Comments: 4 fish caught on deep line.

F/V Taasinge, Longline Set #6

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9
1	B	B	NB	B	NB	NB	B	NB	B
2	NB	B	B	B	NB	NB	B	B	B
3	NB	B	B	B	NB	NB	B	B	NB
4	NB	B	B	B	NB	NB	NB	B	NB
5	B	B	B	B	NB	B	B	B	B
6	NB	B	B	B	B	NB	NB	B	B
7	ALB	B	B	B	B	B	B	B	NB
8	NB	B	B	B	B	B	B	B	NB
9	NB	B	B	B	B	(FISH)	B	B	B
10	NB	B	B	B	B	(FISH)	B	B	B
11	B	B	B	B	B	(FISH)	B	B	ALB
12	B	B	B	B	B	B	B	B	NB
13	B	B	B	B	B	B	B	B	B
14	B	B	B	B	B	B	B	B	B
15	ALB	B	B	B	NB	B	B	B	B
16	ALB	B	B	B	B	B	B	B	B
17	NB	B	B	NB	B	B	B	B	NB
18	NB	B	B	B	B	B	B	B	B
19	NB	B	B	B	B	B	B	B	B
20	ALB	B	B	B	B	B	B	B	B
21	B	B	B	B	NB		B	B	B
22	B	B	B	B	B		B	B	B
23	B	B	NB	B	B		B	NB	B
24	NB	B	B	B	B		B	B	B
25	B	B	B	B	B			B	B
26	B	B	B	B	B			B	B
27	B	B		NB	B			B	B
28	B	B		B	B			B	B
29	B	B		ALB	B			B	NB
30	B	B		B				B	B
31	B	B		B				B	B
32	B			B				B	NB
33	B			B				B	B
34				NB				B	NB
35								B	B
36								B	B
37								B	NB
38								B	B
39								B	B
40								B	NB
41								B	
42								B	
43								NB	
44								NB	
45								B	
46								B	
47								B	
48								B	
49								B	
50								B	
51								B	
52								B	
53								NB	
54								B	
55								B	
56								B	
57								RAY	
58								B	
59								B	
Cum Totals:									
# of Alb.	4	4	4	5	5	5	5	5	6
# of Hooks	33	64	90	124	153	173	197	256	296

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 28, 1981 Set No.: 7

Position Begin Set: 31°40'N, 134°29'W

Position End Set: Not recorded

Time Set Began: 0830 PST Soaking Time: 4-1/2 to 9-1/2 hours

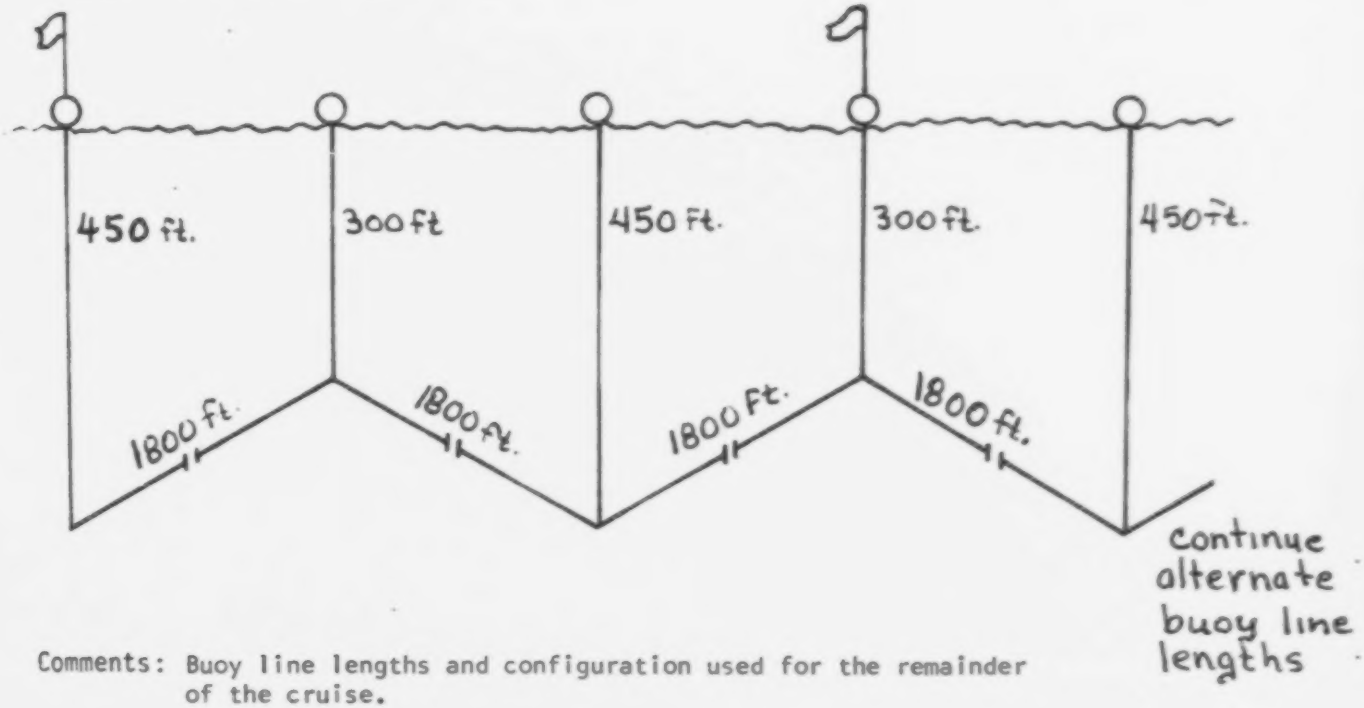
Type Hooks: #8 Mustad tuna circle hook No. Hooks: 341 Bait: squid & saury

Gangion Material and Length: 6-8 ft. 250-300# test monofilament No. Skates: 14

Direction of Set: Not recorded Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15-20 kt wind, 6-10 ft. seas

Schematic Drawing of Gear:



Comments: Buoy line lengths and configuration used for the remainder of the cruise.

F/V Taasinge, Longline Set #7

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14
1	B	B	B	(FISH)	B	B	NB	ALB	NB	B	NB	NB	ABT	B
2	B	B	B	B	ALB	B	B	NB	B	ALB	(FISH)	B	NB	NB
3	B	B	B	NB	B	ALB	NB	ALB	B	B	NB	B	NB	NB
4	NB	B	NB	B	NB	B	NB	NB	B	ALB	NB	ALB	(FISH)	NB
5	B	B	B	B	ALB	B	B	NB	NB	NB	NB	B	NB	B
6	ALB	B	NB	B	NB	B	B	ALB	NB	(FISH)	NB	NB	(FISH)	B
7	B	B	B	NB	B	(ALB)	NB	NB	B	B	NB	B	NB	B
8	B	B	B	B	B	ALB	NB	ALB	B	B	NB	NH	NB	NB
9	B	B	B	NB	B	B	NB	NB	B	B	NB	ALB	(FISH)	B
10	B	B	B	NB	B	NB	B	B	B	NB	NB	ALB	B	NB
11	B	B	NB	NB	B	B	NB	ALB	B	NB	(FISH)	NB	NB	B
12	ALB	B	B	NB	B	NB	B	B	NB	NB	NB	B	NB	B
13	B	B	B	ALB	B	B	NB	B	B	B	NB	B	NB	B
14	B	B	NB	B	B	NB	B	NB	NB	ALB	NB	NB	B	ALB[b]
15	NB	B	B	NB	B	B	NB	NB	B	ALB	NB	B	NB	B
16	B	B	B	B	B	NB	NB	B	B	NB	(FISH)	NB	B	NB
17	B	B	NB	B	B	NB	NB	B	NB	NB	NB	ALB	NB	NB
18	B	B	NB	B	B		B	B	B			NB	NB	B
19	B	B	B	NB	NB		B	NB	B			B	NB	B
20	B	B	NB	B	B		NB	B	B				NB	B
21	B	B	B	B	NB		ALB	B	ALB				B	B
22		B	B	B			B	B	NB				B	B
23		B	B	B				B	NB					B
24		B	B	B				ALB						B
25		B	B	ALB				NB						B
26		B	NB	B				B						B
27		B	B	B				B						B
28		B	NB	B										B
29		B	NB	NB										B
30		B	NB	B										B
31		B	NB											B
32		B	NB											ALB
33		B	B											NB
34		B	NB											NB
35		B	NH											
36		B												
Cum Totals:														
# of Alb.	2	2	2	4	6	8	9	15	16	20	20	24	24	26
# of Hooks	21	57	92	122	143	160	182	209	232	249	266	285	307	341

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

[b]Shark bitten.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 29, 1981 Set No.: 8

Position Begin Set: 31°30'N, 134°17'W

Position End Set: 31°34'N, 134°22'W

Time Set Began: 0800 PST Soaking Time: 5-9 hours

Type Hooks: #8 Mustad tuna circle hook No. Hooks: 343 Bait: squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament No. Skates: 15

Direction of Set: Southeast to Northwest Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 6 ft. seas

Schematic Drawing of Gear:

See Set #7

Comments:

F/V Taasinge, Longline Set #8

Hook Retrieval	Buoy[a] # 1	Buoy[b] # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14	Buoy # 15
1	B	B	B	NB	NB	B	NB	ALB	NB	NB	ALB	NB	B	NB	NB
2	B	B	B	ALB	B	B	B	NB	B	ALB	NB	NB	NB	NB	NB
3	B	ALB	B	ALB	B	B	B	ALB	NB	NB	NB	NB	NB	NB	NB
4	NB	B	B	NB	B	ALB	B	NB	NB	B	NB	NB	NB	NB	B
5	B	NB	B	NB	B	B	NB	B	B	NB	NB	NB	NB	NB	ALB
6	B	B	NB	NB	B	NB	NB	NB	B	ALB	NB	B	NB	NB	B
7	B	B	B	(FISH)	NB	(FISH)	NB	ALB	NB	NB	B	NB	NB	NB	B
8	B	B	B	NB	ALB	B	ALB	B	ALB	NB	NB	NB	B	NB	B
9	B	B	B	ALB	NB	B	B	NB	NB	NB	NB	NB	NB	NB	B
10	B	ALB	NB	NB	B	B	B	NB	ALB	NB	NB	NB	B	NB	NB
11	B	B	B	B	NB	B	NB	B	NB	ALB	B	ALB	NB	NB	NB
12	B	ALB	ALB	B	NB	B	ALB	ALB	B	NB	NB	NB	NB	NB	NB
13	B	B	B	B	ALB	B	NB	B	NB	NB	NB	NB	NB	NB	B
14	B	B	B	B	ALB	NB	NB	NB	B	NB	ALB	NB	B	NB	B
15	B	B	NB	B	B	ALB	NB	NB	B	NB	ABT	NB	B	NB	ALB
16	B	NB	NB	B	B	B	ALB	B	NB	NB	NB	B	B	NB	NB
17	B	B	NB	B	ALB	NB	NB	B	B	NB	NB		NB	ALB	NB
18	B	B	NB	B	B	B	NB	(FISH)	B	NB	B		NB	NB	B
19	B	B	NB	RAY	NB	B	NB		B	NB	NB		NB	B	NB
20	B	NB	B	NB	NB	B			B	NB	B		NB	B	B
21	B	B	ALB	B	NB	B			B	NB	NB		NB	B	NB
22	B	B		B	NB				B	NB			NB	NB	NB
23	NB	NB		B	NB				B	NB			NB	NB	
24	B	ALB		NB	B				(FISH)	NB			B	NB	
25	B	B		NB	B					ALB				NB	
26	B	NB													
27	B	NB													
28		B													
29		B													
30		ALB													
Cum Totals:															
# of Alb.	0	5	7	10	14	16	19	23	25	29	31	32	32	33	35
# of Hooks	27	57	78	103	128	149	168	186	210	235	256	272	296	321	343

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

[b]Buoy line tangled; not fishing at depth of buoy line.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 30, 1981 Set No.: 9

Position Begin Set: 31°26'N, 134°13'W

Position End Set: Not recorded

Time Set Began: 0730 PST Soaking Time: 5-1/2 to 10-1/2 hours

Type Hooks: #8 Mustad tuna circle hook No. Hooks: 386 Bait: squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament No. Skates: 15

Direction of Set: Not recorded Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 3 ft. swell

Schematic Drawing of Gear:

See Set #7

Comments:

F/V Taasinge, Longline Set #9

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14	Buoy # 15
1	B	B	ALEP	B	B	B	B	B	B	B	ALB	B	ALB	B	B
2	B	B	B	B	B	NB	B	ALB	B	B	B	B	B	B	B
3	B	B	B	ALB	B	(FISH)	B	B	B	NB	B	B	B	B	B
4	B	B	B	B	B	B	B	B	B	B	B	B	NB	B	B
5	B	B	B	B	B	NB	3	B	B	B	ALB	ALB	B	B	B
6	B	B	B	B	B	B	B	B	B	ALB	B	B	B	B	NB
7	B	(FISH)	B	B	B	B	B	B	B	B	B	B	B	B	B
8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9	B	NB	B	B	NB	B	B	NB	B	NB	B	B	B	B	B
10	B	B	B	B	NB	B	B	B	B	NB	B	B	B	B	B
11	B	B	B	B	B	B	B	B	B	NB	B	NB	B	B	B
12	B	B	B	ALB	B	B	B	B	B	B	B	B	B	B	B
13	B	B	B	B	NB	B	NB	B	B	B	B	B	ALB	B	B
14	B	ALB	B	B	B	NB	B	B	B	B	B	ALB	B	B	NB
15	B	NB	B	B	B	B	B	B	B	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	B	NB	B	B	B
17		B	B	ALB	B	NB	B	B	B	B	B	ALB	B	NB	B
18		B	B	NB	B	ALB	B	NB	B	B	NB	B	B	B	B
19		B	B	B	B	B	B	B	B	B	NB	B	B	NB	B
20		B	B	B	B	ALB	NB	B	B	B	NB	NB	B	B	B
21		NB	ALB	B	B	B	ALB	B	B	B	B	B	B	B	B
22		B	B	B	B	B	B	B	B	NB	B	B	B	NB	B
23		B	B	B	B	ALB	B	B	B	B			B	B	B
24		NB	B	B	B	B		B	B	NB			B	B	B
25		B	NB	B	NB	B		B	B	B			B	B	B
26		B	NB	B	(FISH)	B			B	B			B	B	B
27		B	B	B		B			B				B		
28			NB						B				B		
29			B						B						
30			ABT						B						
31									B						
32									NB						
33									NB						
34									B						
35									NB						
Cum Totals:															
# of Alb.	0	1	2	5	5	8	9	10	10	11	13	16	18	18	18
# of Hooks	16	43	73	100	126	153	176	201	236	262	284	306	334	360	386

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: January 31, 1981 **Set No.:** 10

Position Begin Set: 31°15'N, 134°46'W

Position End Set: Not recorded

Time Set Began: 0730 PST **Soaking Time:** 6-1/2 to 9 hours

Type Hooks: #8 Mustad tuna circle hook **No. Hooks:** 391 **Bait:** squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament **No. Skates:** 14

Direction of Set: North to South **Order of Pick Up:** First buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 4-6 ft. seas

Schematic Drawing of Gear:

See Set #7

Comments:

[redacted]

6d

F/V Taasinge, Longline Set #10

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy[b] # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14
1	B	NB	B	B	B	B	B	B	NB	ALB	NB	(FISH)	B	B
2	B	NB	B	B	B	B	B	B	B	B	ALB	B	B	B
3	B	NB	B	B	B	B	B	B	B	B	B	B	B	B
4	NB	B	B	B	B	B	B	B	B	B	B	B	B	NB
5	B	NB	NB	NB	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B	ALB	B	B	B	B
7	B	B	B	B	B	B	B	B	B	ALB	NB	B	B	B
8	B	NB	B	B	B	B	B	B	B	NB	NB	ALB	ALB	B
9	B	B	NB	B	B	B	B	B	B	NB	ALB	B	B	NB
10	B	B	B	B	B	B	B	B	NB	ALB	ALB	B	B	NB
11	B	B	NB	B	B	B	B	B	B	B	NB	B	NB	B
12	B	B	B	NB	B	B	B	NB	B	B	B	B	B	B
13	B	B	ALB	B	B	B	B	B	B	B	NB	B	B	NB
14	B	B	B	B	B	NB	B	B	B	B	NB	B	B	B
15	B	NB	B	B	B	B	B	B	B	B	NB	B	(FISH)	B
16	NB	B	B	B	B	NB	B	B	B	B	NB	NB	B	B
17	NB	B	NB	B	B	ALB	B	B	RAY	B	B	NB	B	B
18	B	B	B	B	B	B	B	B	B	B	B	NB	B	B
19	B	B	B	B	B	NB	B	B	B	B	B	NB	B	B
20	B	NB	NB	B	NB	ALB	NB	B	B	NB	ALB	NB	B	B
21	NB	B	B	B	B	ALB	B	ALB	B	ALB	B	ALB	B	B
22	NB	B	B		NB	B	B	B	B	B	NB	NB	ALB	B
23	NB	B	NB		B	B	ALB	B	B	B	B	NB	NB	NB
24	B	B	NB		NB	ALB	B	NB	B	B	ALB	NB	ALB	ALB
25	NB	B	B		B	B	B	B		B	ALB	NB	B	ALB
26	B	B	NB			B	B	B		NB	B	NB	B	B
27	NB					B	B	NB		B	B	ALB	B	B
28	NB					B	B			ALB	B	NB		B
29	NB					B	B			ALB	B	ALB		
30						B	B			ALB		B		
31						B	B			ALB		B		
32							B			ALB		B		
33							B					NB		
Cum Totals:														
# of Alb.	0	0	1	1	1	5	6	7	7	17	23	27	30	32
# of Hooks	29	55	81	102	127	158	191	218	242	274	303	336	363	391

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

[b]Buoy line tangled; not fishing at depth of buoy line.

KEY:
B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost
ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: February 1, 1981 Set No.: 11

Position Begin Set: 31°14'N, 134°43'W

Position End Set: 31°10'N, 134°40'W

Time Set Began: 0800 PST Soaking Time: 5-1/2 to 8-1/2 hours

Type Hooks: #8 Mustad tuna circle hook No. Hooks: 483 Bait: squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament No. Skates: 16

Direction of Set: Northwest to Southeast Order of Pick Up: First buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 3 ft. seas

Schematic Drawing of Gear:

See Set #7

Comments:

F/V Taasinge, Longline Set #11

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy[b] # 11	Buoy # 12	Buoy # 13	Buoy # 14	Buoy # 15	Buoy # 16
1	B	B	B	B	NB	B	B	B	NB	B	B	B	B	B	B	B
2	B	B	B	B	NB	B	B	B	B	B	NB	B	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NB	B
5	B	B	B	B	B	B	B	B	NB	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	NB	NB	B	NB	B	ALB	B	B
7	B	B	ALB	B	B	B	B	B	B	NB	B	B	B	B	B	B
8	B	B	B	B	B	B	B	B	B	ALB	B	B	B	B	B	B
9	B	B	B	B	B	B	B	B	B	NB	B	B	B	B	B	B
10	B	B	B	B	B	B	(FISH)	B	B	B	B	B	B	B	B	B
11	B	B	B	B	B	B	B	B	B	B	B	B	B	NB	B	B
12	B	B	B	B	B	B	B	NB	B	B	B	B	B	B	B	B
13	B	B	B	B	ALB	B	B	ALB	B	B	B	B	B	B	B	NB
14	B	B	B	B	(ALB)	B	B	B	B	B	B	B	B	NB	B	B
15	B	B	B	B	NB	B	B	B	B	B	B	B	B	NB	B	B
16	NB	B	B	B	B	B	B	B	B	B	B	B	B	NB	ALB	B
17	B	B	NB	B	B	B	B	B	B	B	B	B	B	B	B	B
18	B	B	ALB	B	B	B	B	B	B	B	B	B	B	B	B	B
19	B	NB	B	B	B	B	B	B	B	B	B	B	B	B	B	B
20	ALEP	B	NB	B	B	B	B	B	B	B	B	B	B	B	B	B
21	B	B	NB	B	B	B	B	B	ALB	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
23		B	B	B	B	B	B	B	B	B	B	B	B	ALB	B	
24		B	B	B	B	B	B	B	B	B	B	B	NB	NB	B	
25		B	B	ALB	B	ALB	B	B	B	B	B	B	B		ALB	
26		B	B	B	B	B	B	B	B		B	B	B		B	
27		B	B	B	B	ALB	B	B	B			B	B		B	
28		B	B	B	NB	B	B	B	B				B		B	
29		B	B	B	ALB	B	B	B	B				B		B	
30		B	B	NB	B	B		B	B				B		B	
31		B		B	B			B	B				B		B	
32		B		B	B			B	B						B	
33		B			B			B	B						B	
34		B			B			B	B						B	
35		B			B			B	B							
36		B						B	B							
37		B						B	NB							
38		B						B								
39								B								
40								B								
41								NB								
Cum Totals:																
# of Alb.	0	0	2	3	5	7	7	8	9	10	10	10	10	12	14	14
# of Hooks	22	60	90	122	157	187	216	257	294	319	345	372	403	427	461	483

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

[b]Buoy line tangled; not fishing at depth of buoy line.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: February 2, 1981 **Set No.:** 12

Position Begin Set: 31°05'N, 134°50'W

Position End Set: 31°03'N, 134°51'W

Time Set Began: 0730 PST **Soaking Time:** 5-1/2 to 10 hours

Type Hooks: #8 Mustad tuna circle hook **No. Hooks:** 474 **Bait:** squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament **No. Skates:** 15

Direction of Set: Southwest to Northeast **Order of Pick Up:** Last buoy picked up first

Weather and Sea Conditions: Rain, calm seas, light breeze

Schematic Drawing of Gear:

See Set #7

Comments:

F/V Taasinge, Longline Set #12

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14	Buoy # 15
1	NB	B	ALB	B	ALB	B	B	B	B	B	B	B	B	NB	(FISH)
2	B	NB	NB	B	B	B	B	B	B	B	B	B	B	B	NB
3	B	B	B	B	B	(FISH)	B	B	B	B	B	B	B	B	NB
4	B	NB	B	NB	B	(FISH)	B	B	B	B	B	B	B	NB	B
5	B	B	ALB	B	NB	NB	B	B	NB	B	B	NB	B	ALB	B
6	B	B	B	ALB	B	NB	ALB	ALB	B	NB	B	B	B	ALB	B
7	NB	B	B	ALB	NB	B	NB	B	B	B	B	B	B	B	NB
8	B	B	B	ALB	NB	B	B	NB	B	B	B	(FISH)	B	B	B
9	B	ALB	B	B	NB	B	ALB	B	B	ALB	B	B	B	B	B
10	B	B	B	NB	NB	NB	B	ALB	B	(FISH)	NB	B	B	NB	NB
11	B	B	B	ALB	ALB	B	B	(FISH)	B	NB	B	NB	B	B	NB
12	(ALB)	B	B	B	ALB	ALB	B	B	ALB	NB	B	B	B	B	NB
13	B	B	B	B	B	NB	B	B	NB	ABT	B	B	B	ALB	B
14	B	ALB	B	B	(FISH)	ALB	B	B	NB	NB	ALB	NB	B	B	NB
15	B	B	B	B	NB	NB	B	(FISH)	B	B	(FISH)	B	ALB	B	B
16	B	B	B	B	ALB	B	B	(FISH)	B	NB	B	ALB	B	B	B
17	B	B	B	B	NB	ALB	B	NB	B	B	ALB	B	NB	B	ALB
18	B	B	B	B	NB	NB	B	B	B	NB	B	B	B	B	B
19	B	B	B	B	NB	NB	ALB	ALB	B	B	(FISH)	B	B	B	ALB
20	B	NB	ALB	B	NB	B	B	B	(FISH)	NB	NB	B	B	B	B
21	NB	B	NB	B	NB	ALEP	B	B	B	B	B	B	NB	B	B
22	B	ALB	NB	NB	NB	NB	B	B	B	NB	NB	ALB	ALB	NB	B
23	B	B	ALB	B	NB	B	(FISH)	B	B	ALB	(ALEP)	NB	B	B	B
24	ALB	NB	B	B	ALB	B	B	B	B		B	B	NB	B	B
25	B	B	NB	B	NB	B	ALB	B			ALB	B	B	B	NB
26	B	B	NB		NB	B	B	B			(FISH)	NB	B	B	B
27		ALB	NB		ALB	B	B	B			B	NB	ALB	B	B
28		B	ALB			ALB	B	B			B	NB	B	B	B
29		NB	NB			B	B	NB			NB	NB	B	B	ALB
30		B	B			B	B	ALB			B	NB	B	NB	NB
31		B				B	B	B			ALB	NB	B	B	B
32		ALB				B	B	B			ALB	B	ALB	B	
33		B					ALB	B				B	B	B	
34		NB					B	B				B		B	
35							B	B				B		B	
36							NB	B				B		B	
37							ALB	B				B		B	
38							(FISH)							ALB	
39							ALB							B	
40														B	
41														B	
42														B	
43														B	
44														ALB	
Cum Totals:															
# of Alb.	1	6	11	15	21	25	32	36	37	39	44	46	50	55	58
# of Hooks	26	60	90	115	142	174	213	250	274	297	329	366	399	443	474

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: February 3, 1981 Set No.: 13

Position Begin Set: 31°05'N, 134°53'W

Position End Set: Not recorded

Time Set Began: 0800 PST Soaking Time: 5-1/2 to 9 hours

Type Hooks: #8 Mustad tuna circle hook No. Hooks: 487 Bait: squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament No. Skates: 15

Direction of Set: West to East Order of Pick Up: First buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

See Set #7

Comments:

F/V Taasinge, Longline Set #13

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11	Buoy # 12	Buoy # 13	Buoy # 14	Buoy # 15
1	B	B	B	B	NB	B	B	B	B	B	B	B	ALB	B	ALB
2	NB	B	B	B	B	NB	B	B	B	ALB	B	B	NB	B	ALB
3	ALB	B	NB	B	ALB	B	B	B	B	B	B	B	NB	B	B
4	B	B	B	B	B	ALB	B	B	ALB	B	B	B	B	B	B
5	B	B	B	B	B	B	B	B	NB	B	B	B	B	NB	B
6	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
7	NB	B	B	B	B	B	B	B	B	ALEP	NB	NB	B	B	B
8	B	B	B	NB	B	B	B	ALB	B	B	NB	NB	B	B	B
9	B	B	NB	B	B	B	B	NB	B	NB	B	B	B	B	B
10	B	B	ALB	B	B	ALEP	B	NB	B	NB	B	NB	NB	ALB	B
11	B	B	B	B	ALB	B	B	NB	B	NB	B	B	B	B	B
12	B	B	B	B	B	B	B	B	B	B	B	B	B	NB	B
13	B	ALB	B	B	B	B	B	B	B	B	NB	B	B	ALB	NB
14	B	B	NB	B	NB	B	B	(FISH)	B	B	NB	B	B	NB	ALB
15	B	B	B	B	ALB	B	B	NB	B	NB	(FISH)	B	B	ALB	B
16	NB	B	B	NB	NB	B	NB	B	B	B	B	NB	B	B	B
17	B	B	B	B	B	B	B	ALB	B	B	B	NB	B	B	ALB
18	ALB	B	NB	ALB	B	B	B	NB	B	B	B	B	B	B	(FISH)
19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NB
20	NB	B	B	B	B	B	B	B	B	B	B	B	B	ALB	
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
22	B	B	B	B	B	B	B	NB	B	B	B	B	B	B	
23	B	NB	B	B	B	B	(ALB)	NB	B	B	B	B	ALB	B	
24	B	B	B	B	B	B	B	NB	B	B	B	ALB	B	NB	
25	B	B	B	B	B	B	B	ALB	B	NB	B	B	B		
26	B	B	B	B	B	B	B	B	B	B	B	B	B		
27	B	B	B	B	B	B	B	ALB	B	B	B	B	NB		
28	B	B	B	ALB	B		B	B	B	B	B	B	B		
29	B	B	B		B			ALB	B	B		B	NB		
30	B	B	B		B			NB	B			ALB	B		
31	B	B	NB		ALB			B	B			B			
32	B	B	B		ALB			B	B			NB			
33	B	B	B		B			B	B			B			
34	B	B	B		B			B	B			B			
35	B	B	B		B			ALB	B			B			
36		B	B		B			B	B			B			
37		B			B			B	B			B			
38		NB			B			B	B						
39		NB			NB			B	B						
40		B			B										
41		B			ALB										
42		B													
43		B													
Cum Totals:															
# of Alb.	2	3	4	6	12	13	13	19	20	21	21	23	25	29	33
# of Hooks	35	78	114	142	183	210	238	277	316	346	375	413	444	468	487

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
NH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Taasinge

Date: February 5, 1981 **Set No.:** 14

Position Begin Set: 32°49'N, 132°28'W

Position End Set: Not recorded

Time Set Began: 0830 PST **Soaking Time:** 4-1/2 to 7-1/2 hours

Type Hooks: #8 Mustad tuna circle hook **No. Hooks:** 350 **Bait:** squid & saury

Gangion Material and Length: 6 ft. 250-300# test monofilament **No. Skates:** 11

Direction of Set: West to East **Order of Pick Up:** first buoy picked up first

Weather and Sea Conditions: 20 kt. wind, 6 ft. seas

Schematic Drawing of Gear:

See Set #7

Comments: Erben Bank, east side.

F/V Taasinge, Longline Set #14

Hook Retrieval	Buoy[a] # 1	Buoy # 2	Buoy # 3	Buoy # 4	Buoy # 5	Buoy # 6	Buoy # 7	Buoy # 8	Buoy # 9	Buoy # 10	Buoy # 11
1	B	B	B	B	B	B	B	B	B	B	B
2	NB	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	(FISH)	B	B	B	B	B
4	B	B	B	B	B	B	B	ALB	B	B	B
5	B	NB	B	B	RAY	B	B	B	B	B	B
6	B	B	B	NB	B	B	B	B	B	B	NB
7	B	B	B	B	B	B	B	B	B	B	B
8	B	B	B	B	B	B	B	NB	B	B	B
9	NB	B	B	B	B	B	B	NB	B	B	NB
10	B	NB	B	B	B	B	B	B	B	B	B
11	B	B	NB	B	B	B	B	B	B	B	B
12	B	B	NB	B	B	B	B	B	B	B	NB
13	NB	B	B	B	B	B	B	B	B	B	B
14	NB	B	B	B	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	B
17	B	B	B	B	B	B	B	B	B	B	B
18	B	B	B	B	B	B	B	B	NB	B	B
19	B	B	B	B	B	B	B	B	B	B	B
20	B	B	B	B	B	B	B	B	B	B	B
21	B	B	B	B	B	B	ALB	B	B	B	B
22	B	B	B	B	B	B	B	B	B	NB	B
23	B	B	B	B	B	B	B	B	B	NB	B
24	B	B	B	NB	B	B	NB	B	B	NB	B
25	B	B	B	B	B	B	B	B	B	MSH	B
26	B	B	B	B	B	B	B	B	B	NB	B
27	B	B	B	B	B	B	B	B		B	B
28	B	B	B	B	B	B	B	B		B	B
29	B	B	OPAH	B	B	B	B				B
30	B	B	B		B	B	B				B
31	B	B	B			B	B				B
32	B		B			B	B				B
33	B		B			NB	B				B
34			B			B	B				B
35						B	B				B
36						B	B				
37						B	B				
38						B	B				
Cum Totals:											
# of Alb.	0	0	0	0	0	0	1	2	2	2	2
# of Hooks	33	64	98	127	157	195	233	261	287	315	350

[a]Hooks listed under buoy numbers are found on main line between that buoy and the succeeding one, e.g., hooks under buoy #1 are hooks on main line between buoys #1 & 2.

KEY: B = Baited
NB = Bait absent
MH = Hook lost
ALB = Albacore on hook
( ) = Albacore or fish that were lost

ALEP = Lancetfish
RAY = Stingray
ABT = Albatross
POM = Pomfret
MSH = Mako Shark

Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 25, 1981 Set No.: 3A

Position Begin Set: 31°20'N, 134°37'W

Position End Set: Not recorded

Time Set Began: ~0730 PST Soaking Time: ~5-8 hours

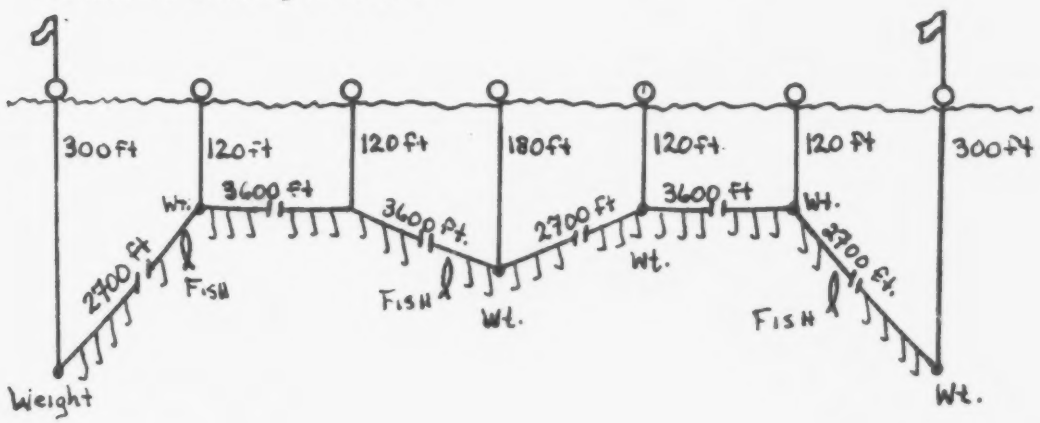
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 275 Bait: squid & saury

Gangion Material and Length: 18 ft. 300# test seine twine w/3-5 ft. 175# test stainless wire No. Skates: 10-1/2

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 2 ft. seas

Schematic Drawing of Gear:



Comments: 1 tub of gear is 900 ft. or ½ "skate". Three fish caught.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 25, 1981 Set No.: 3B

Position Begin Set: 31°20'N, 134°37'W

Position End Set: Not recorded

Time Set Began: 1400 PST Soaking Time: 2 hours

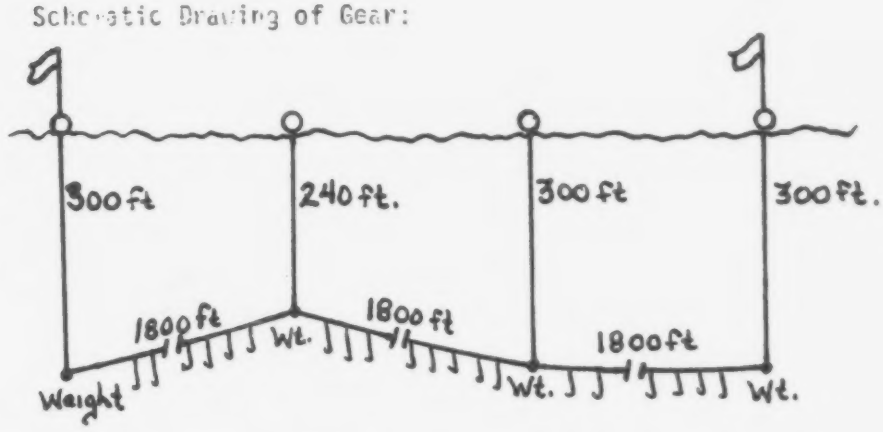
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 75 Bait: squid & saury

Gangion Material and Length: 18 ft. 300# test seine twine w/3-5 ft. 175# test stainless wire No. Skates: 3

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 2 ft. seas

Schematic Drawing of Gear:



Comments: No fish caught.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 26, 1981 Set No.: 4A

Position Begin Set: 31°07'N, 134°54'W

Position End Set: Not recorded

Time Set Began: 0730 PST Soaking Time: 5 to 6-1/2 hours

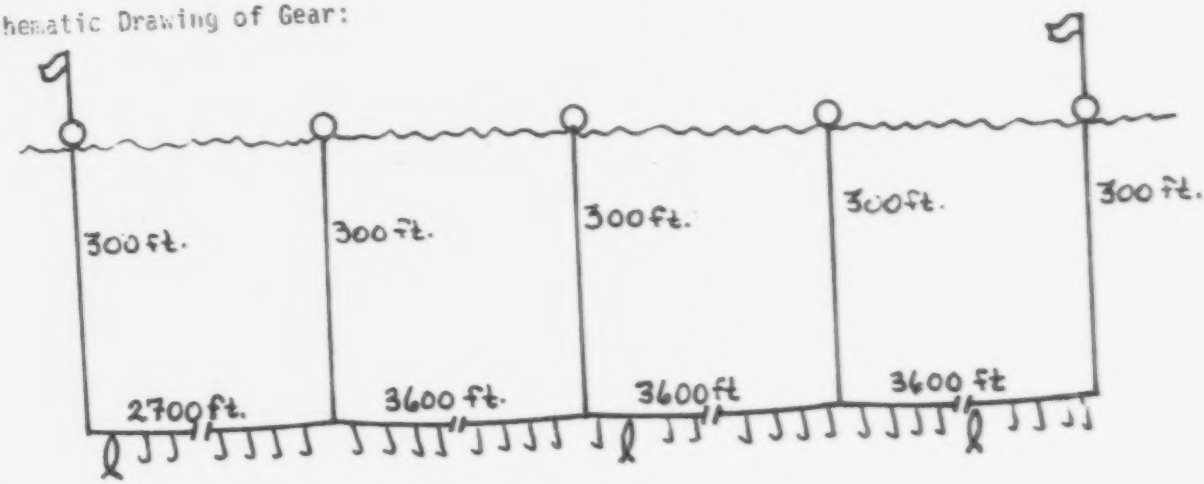
Type Hooks: #34 Japanese tuna hook; No. Hooks: 212 Bait: squid & saury
#8 Mustad tuna circle hook

Gangion Material and Length: 6 ft. 300# test seine twine w/3 ft. 175# test stainless wire No. Skates: 8-1/2

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15-20 kt. wind, 6-8 ft. seas

Schematic Drawing of Gear:



Comments: Three fish caught.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 26, 1981 Set No.: 4B

Position Begin Set: 31°07'N, 134°54'W

Position End Set: Not recorded

Time Set Began: 0800 PST Soaking Time: 7 hours

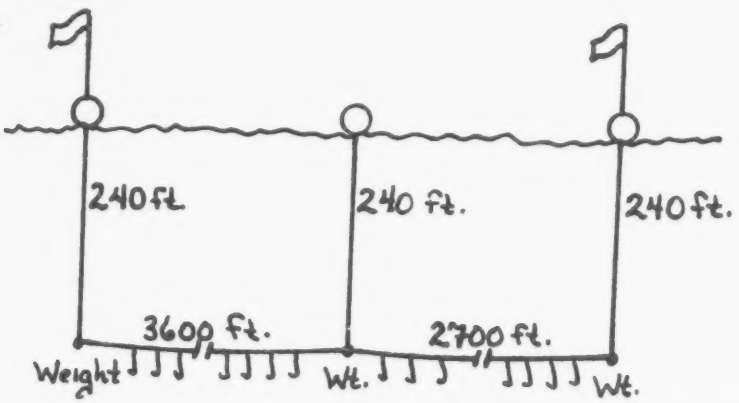
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 87 Bait: squid & saury

Gangion Material and Length: 6 ft. 300# test seine twine w/3 ft. 175# test stainless wire No. Skates: 3-1/2

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15-20 kt. wind, 6-8 ft. seas

Schematic Drawing of Gear:



Comments: No fish caught.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 29, 1981 Set No.: 6

Position Begin Set: 31°20'N, 134°30'W

Position End Set: Not recorded

Time Set Began: 0700 PST Soaking Time: 5-7 hours

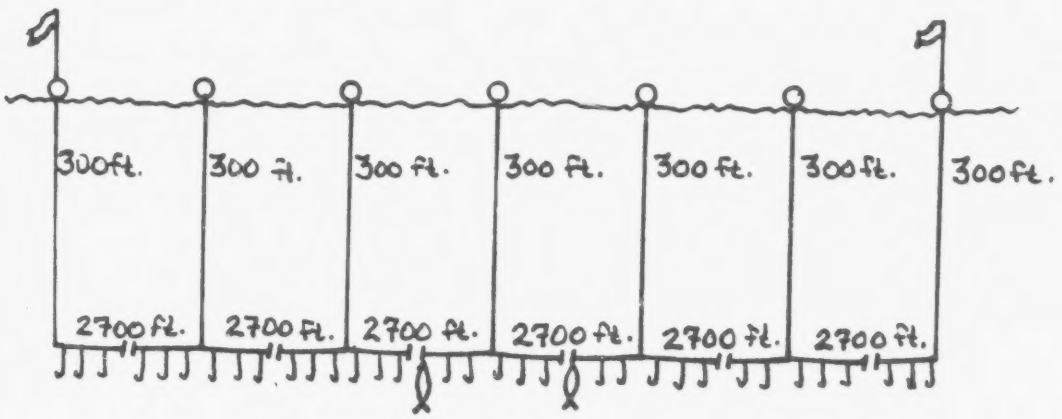
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 200 Bait: squid & saury

Gangion Material and Length: 6 ft. 300# test seine twine w/3 ft. 175# test stainless wire No. Skates: 9

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 10 kt. wind, 4 ft. swell

Schematic Drawing of Gear:



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Comments: Two albacore caught.

Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: January 30, 1981 Set No.: 7

Position Begin Set: 31°10'N, 135°00'W

Position End Set: Not recorded

Time Set Began: 0700 PST Soaking Time: 6 hours

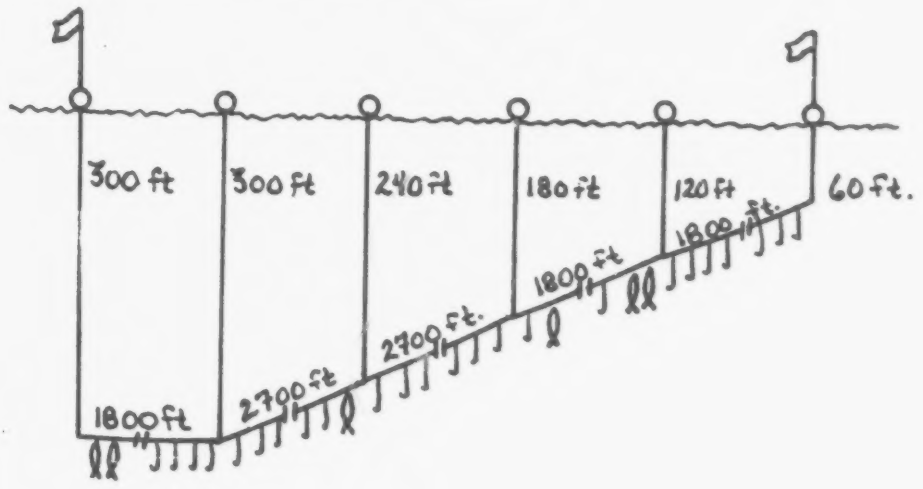
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 150 Bait: squid & saury

Gangion Material and Length: 6 ft. 300# test seine twine w/3 ft. 175# test stainless wire; 6-9 ft. 250-300# test monofilament on #8 Mustad tuna circle hooks No. Skates: 6

Direction of Set: Northwest to Southeast Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 6 ft. swell

Schematic Drawing of Gear:



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Comments: Six albacore caught.

Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: February 1, 1981 Set No.: 9

Position Begin Set: 31°20'N, 135°02'W

Position End Set: Not recorded

Time Set Began: 0730 PST Soaking Time: 6-9 hours

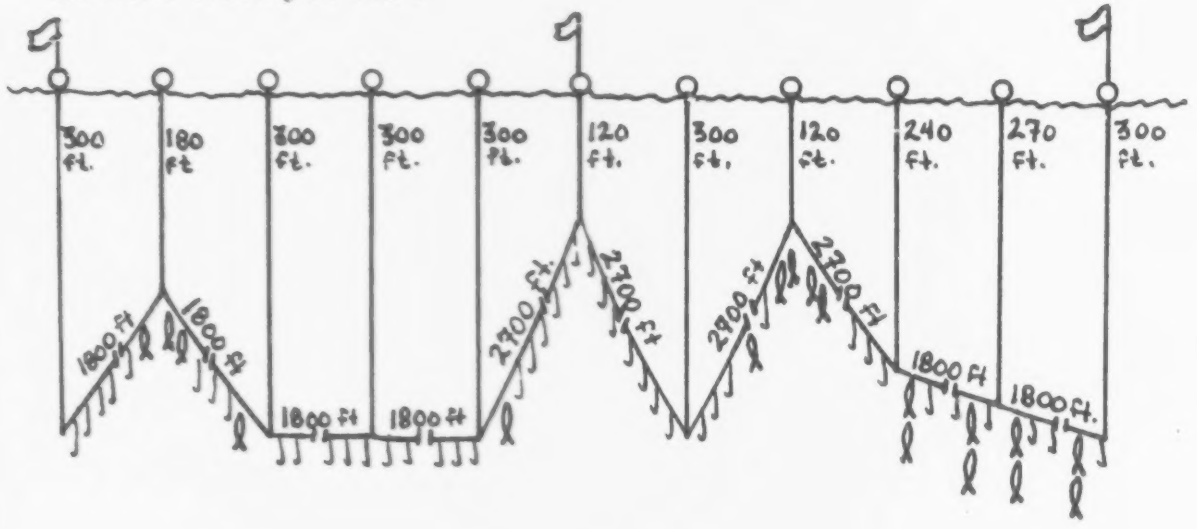
Type Hooks: #34 Japanese tuna hook; #8 Mustad tuna circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 6 ft. 300# test seine twine w/3 ft. 175# test stainless wire; 6-9 ft. 250-300# test monofilament on #8 Mustad tuna circle hooks No. Skates: 12

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 10 kt. wind, 6-8 ft. swell

Schematic Drawing of Gear:



Comments: Monofilament gangions predominate. Eighteen albacore landed.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: February 2, 1981 Set No.: 10

Position Begin Set: 31°10'N, 134°54'W

Position End Set: Not recorded

Time Set Began: 0800 PST Soaking Time: 6-9 hours

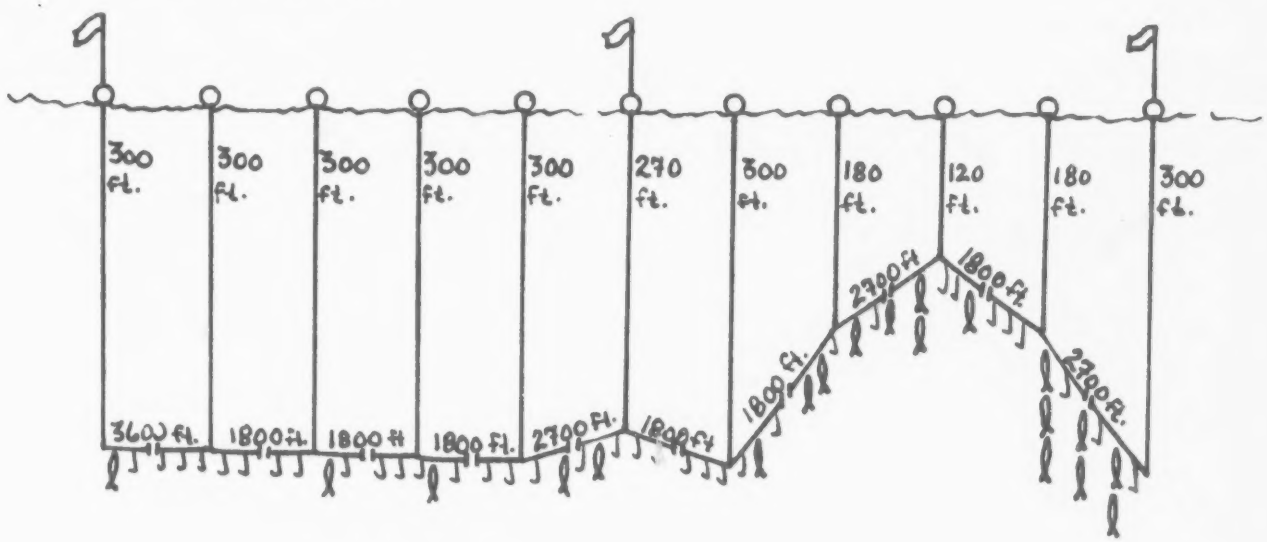
Type Hooks: #8 Mustad tuna circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 6-9 ft. 250-300# test monofilament No. Skates: 12-1/2

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5-10 kt. wind, 5 ft. swell

Schematic Drawing of Gear:



Comments: Twenty albacore landed.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: February 3, 1981 Set No.: 11

Position Begin Set: 31°00'N, 134°50'W

Position End Set: Not recorded

Time Set Began: 0800 PST Soaking Time: 6-9 hours

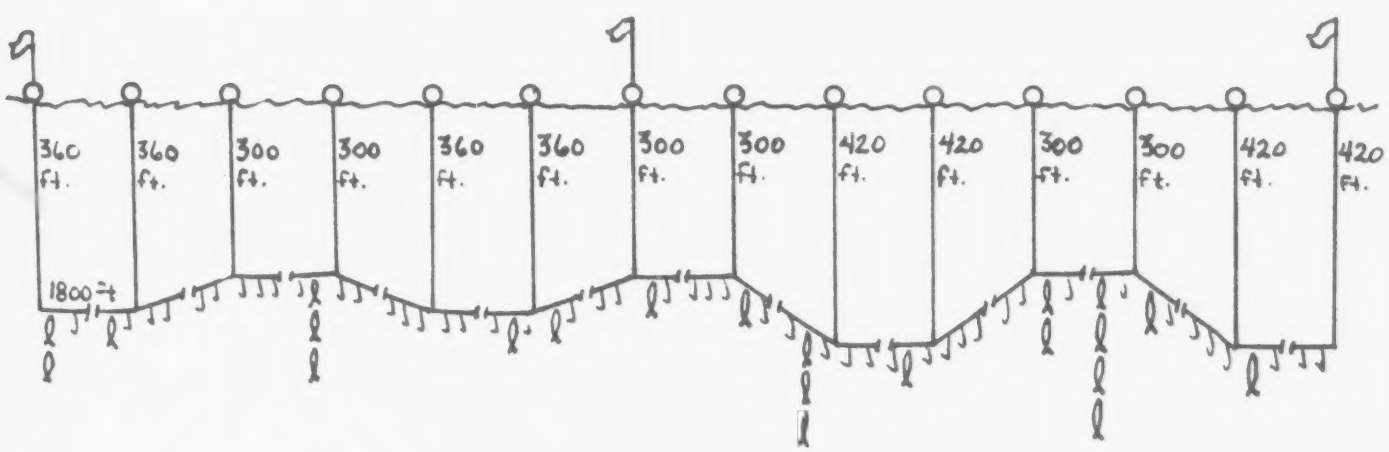
Type Hooks: #8 Mustad tuna circle hook No. Hooks: 350 Bait: squid & saury

Gangion Material and Length: 6-9 ft. 250-300# test monofilament No. Skates: 13

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Set Conditions: 10 kt. wind, 6 ft. swell

Schematic Drawing of Gear:



Comments: 2 tubs or 1 "skate" (1800 ft.) between buoys. Twenty-two albacore landed.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Norcoaster

Date: February 5, 1981 Set No.: 12

Position Begin Set: 32°47'N, 132°33'W

Position End Set: Not recorded

Time Set Began: 0800 PST Soaking Time: 6 hours

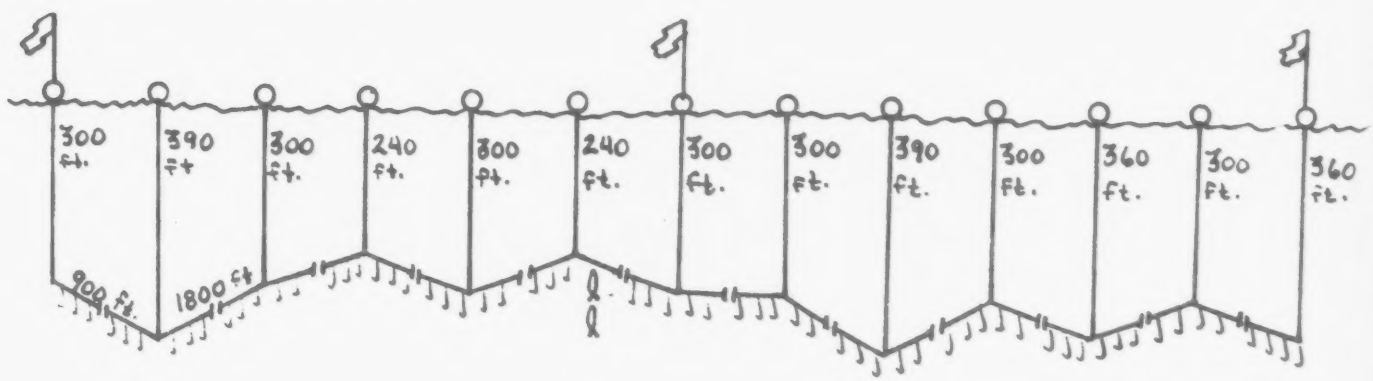
Type Hooks: #8 Mustad tuna circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 6-9 ft. 250-300# test monofilament No. Skates: 11-1/2

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 6 ft. seas

Schematic Drawing of Gear:



Comments: 1 tub between first buoy, 2 thereafter. Two albacore landed.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 23, 1981 Set No.: 1

Position Begin Set: 31°24'N, 134°18'W

Position End Set: Not recorded

Time Set Began: 0730 PST Soaking Time: 5-7 hours

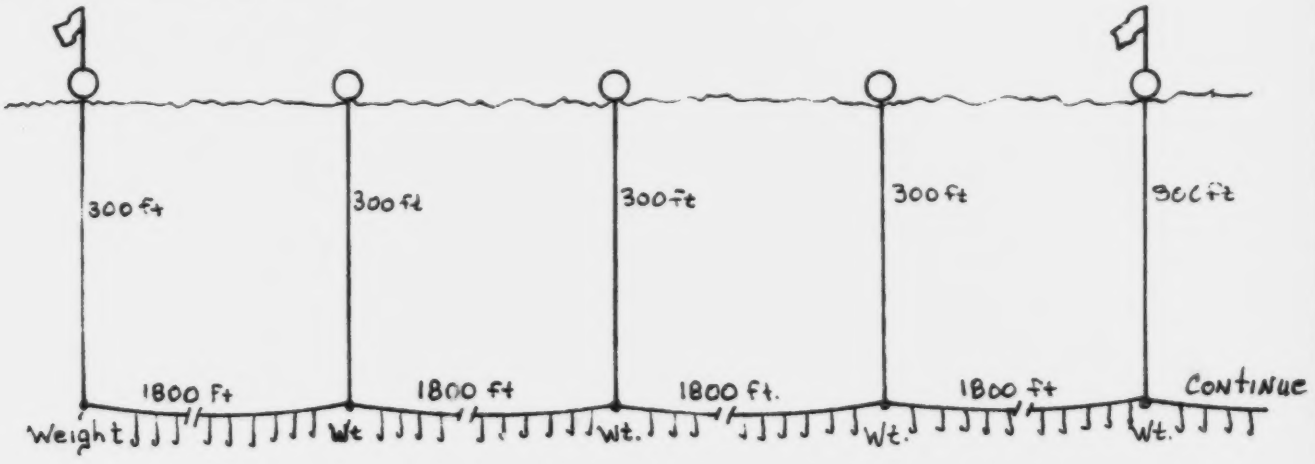
Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 150 Bait: squid & saury

Gangion Material and Length: 9 ft. 1/8" polypropylene w/6 ft. 175# test stainless wire; 9 ft. 1/8" nylon seine twine w/6 ft. 175# test stainless wire No. Skates: 7

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 12 kt. wind, 6 ft. swell

Schematic Drawing of Gear:



Comments: No albacore landed. All Mustad #9 tuna circle hooks were modified by turning the point out slightly.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 24, 1981 Set No.: 2

Position Begin Set: 31°20'N, 134°22'W

Position End Set: 31°16'N, 134°20'W

Time Set Began: 0700 PST Soaking Time: 5-7 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 180 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/3 ft. 175# test stainless wire No. Skates: 9

Direction of Set: North to South Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Comments: Nine albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

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Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 25, 1981 Set No.: 3A

Position Begin Set: 31°31'N, 134°36'W

Position End Set: 31°36'N, 134°40'W

Time Set Began: 0700 PST Soaking Time: 5-8 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 200 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/3 ft. 175# test stainless wire No. Skates: 8

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Comments: Fourteen albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 25, 1981 Set No.: 3B

Position Begin Set: 31°31'N, 134°36'W

Position End Set: Not recorded

Time Set Began: 1300 PST Soaking Time: 2 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 100 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/ 1 ft. 175# test stainless wire No. Skates: 4

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Comments: Five albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 26, 1981 Set No.: 4

Position Begin Set: 31°35'N, 134°26'W

Position End Set: 31°34'N, 134°33'W

Time Set Began: 0700 PST Soaking Time: 4-8 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/ 1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 40 kt. wind, 15 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Comments: Thirteen albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 28, 1981 Set No.: 5

Position Begin Set: 31°40'N, 134°31'W

Position End Set: 31°36'N, 134°25'W

Time Set Began: 0800 PST Soaking Time: 4-1/2 to 7-1/2 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 200 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 8

Direction of Set: Southwest to Northeast Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 12 kt. wind, 15 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Comments: Three albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

[redacted]

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 29. 1981 Set No.: 6

Position Begin Set: 31°22'N, 134°26'W

Position End Set: 31°23'N, 134°29'W

Time Set Began: 0800 PST Soaking Time: 5-8 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hooks; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 200 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/ 3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/ 1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 8

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 5-10 kt. wind, 5 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Microfilmed From
Best Available Copy

Comments: Twenty-one albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 30, 1981 Set No.: 7

Position Begin Set: 31°25'N, 134°20'W

Position End Set: 31°25'N, 134°26'W

Time Set Began: 0730 PST Soaking Time: 5-1/2 to 8 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 217 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/ 3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 9

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: Wind calm, 3-5 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Microfilmed From
Best Available Copy

Comments: Seventeen albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: January 31, 1981 Set No.: 8

Position Begin Set: 31°12'N, 134°42'W

Position End Set: 31°13'N, 134°50'W

Time Set Began: 0700 PST Soaking Time: 4-8 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/ 1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Microfilmed From
Best Available Copy

Comments: Sixteen albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: February 1, 1981 Set No.: 9

Position Begin Set: 31°14'N, 134°49'W

Position End Set: 31°13'N, 134°54'W

Time Set Began: 0715 PST Soaking Time: 5-9 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 15 kt. wind, 3 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Microfilmed From
Best Available Copy

Comments: Twenty-two albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: February 2, 1981 Set No.: 10

Position Begin Set: 31°02'N, 134°54'W

Position End Set: 31°01'N, 134°59'W

Time Set Began: 0700 PST Soaking Time: 5-1/2 to 9-1/2 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: Wind calm, 3 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

Microfilmed From
Best Available Copy

Comments: Thirty-one albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: February 3, 1981 Set No.: 11

Position Begin Set: 31°02'N, 134°54'W

Position End Set: 31°01'N, 134°59'W

Time Set Began: 0700 PST Soaking Time: 5-1/2 to 9-1/2 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: East to West Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 12 kt. wind, 5 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Best Available Copy

Comments: Fifteen albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.

Summary of Longline Fishing Methods and Catch Information Made By F/V Vinland

Date: February 5, 1981 Set No.: 12

Position Begin Set: SW corner Erben Bank
32°40'N, 132°11'W

Position End Set: Not recorded

Time Set Began: 0700 PST Soaking Time: 5-9 hours

Type Hooks: #34 Japanese tuna hook; #9 Mustad tuna circle hook; 9/0 rock cod hook; 8/0 circle hook No. Hooks: 300 Bait: squid & saury

Gangion Material and Length: 4½ ft. 1/8" polypropylene w/3 ft. 175# test stainless wire; 4½ ft. 1/8" nylon seine twine w/1 ft. 175# test stainless wire; 6-8 ft. 250# test monofilament No. Skates: 12

Direction of Set: West to East Order of Pick Up: Last buoy picked up first

Weather and Sea Conditions: 10 kt. wind, 4 ft. swell

Schematic Drawing of Gear:

Same as Set 1.

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Best Available Copy

Comments: Two albacore landed. All #9 Mustad tuna circle hooks were modified by turning the point out slightly.